WELCOME

SIEMENS

Sinamics S120

The new

drive system

for demanding drive

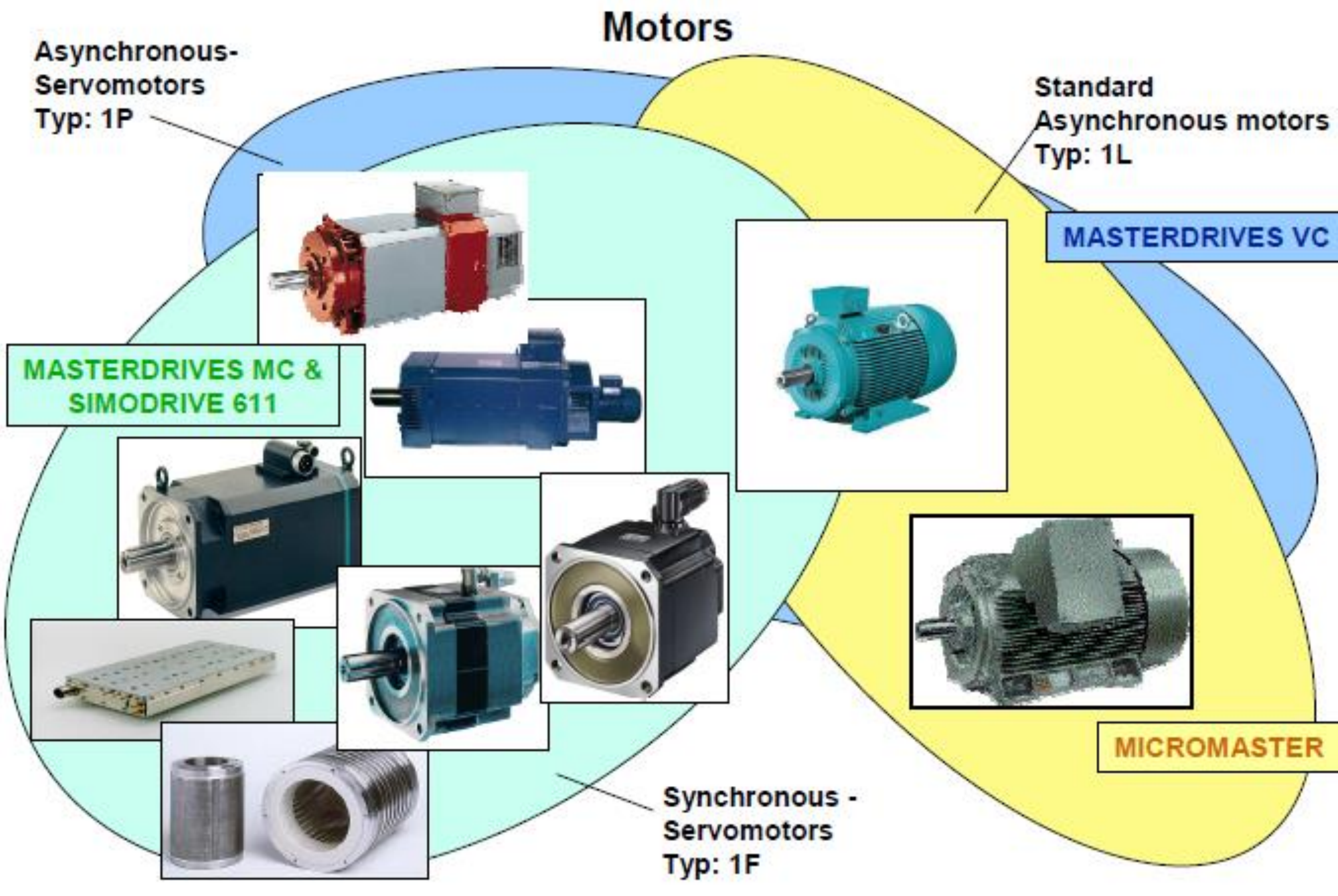
applications in machine

building

and plant construction

By:-
Moghees Ahsan
Dy.Mgr.(ETL-ISP)

1. Basics of AC motors



Motors

Asynchronous-
Servomotors
Typ: 1P

Standard
Asynchronous motors
Typ: 1L

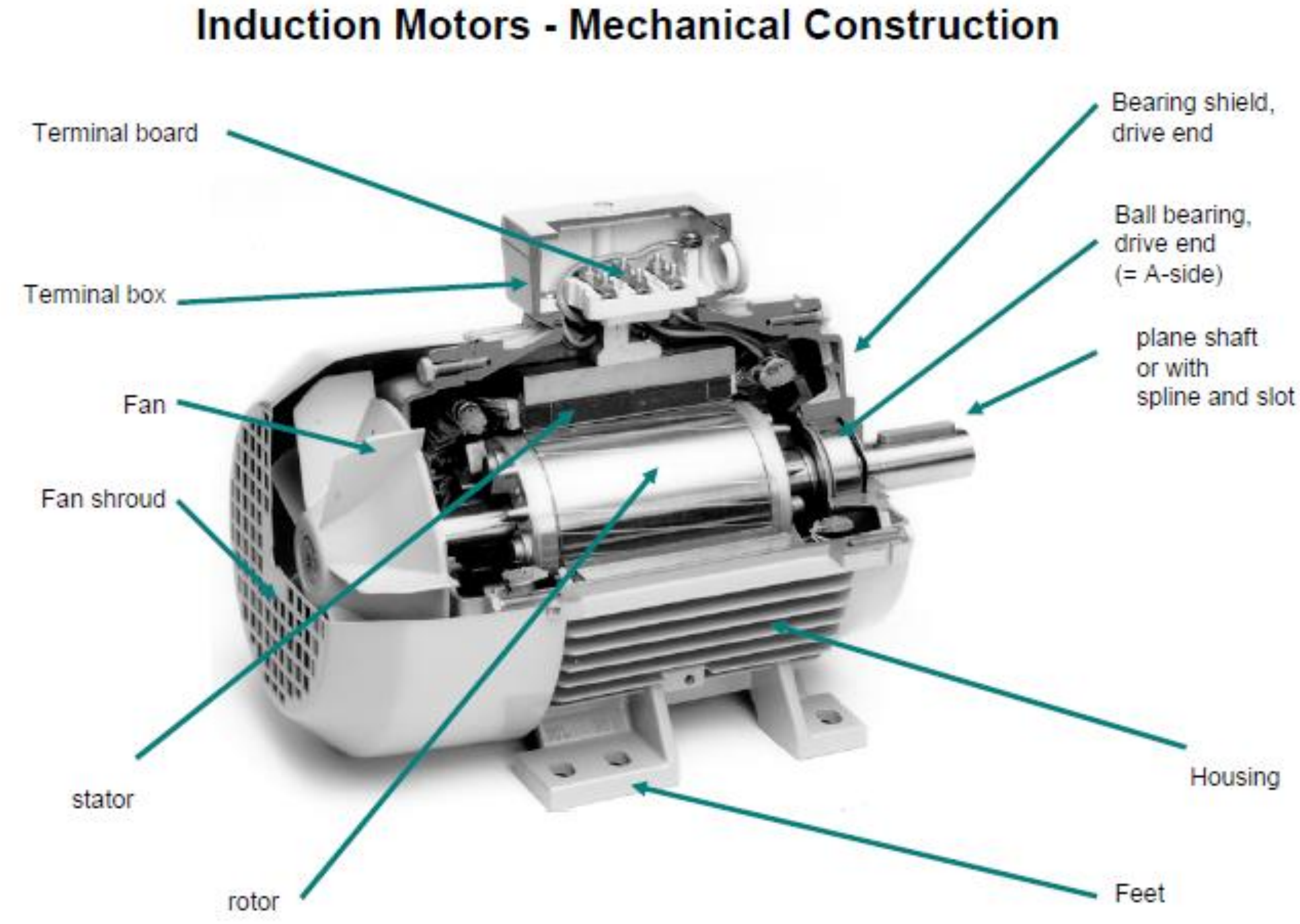
MASTERDRIVES VC

MASTERDRIVES MC &
SIMODRIVE 611

MICROMASTER

Synchronous -
Servomotors
Typ: 1F

Basics of induction motors


Induction Motors - Mechanical Construction

Induction Motors - Principle of Operation

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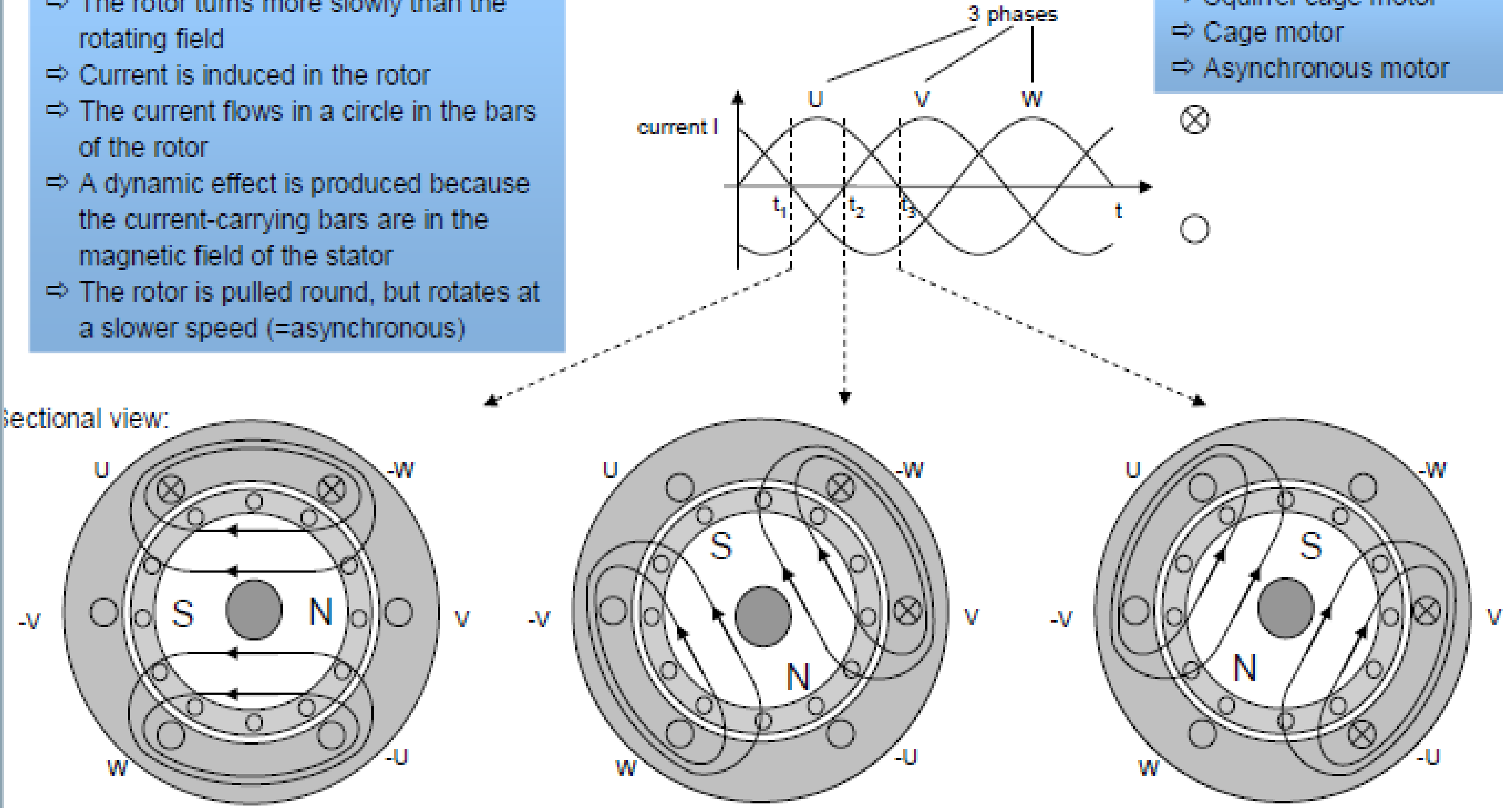
- The three-phase current generates a rotating magnetic field in the stator
- The rotor turns more slowly than the rotating field
- Current is induced in the rotor
- The current flows in a circle in the bars of the rotor
- A dynamic effect is produced because the current-carrying bars are in the magnetic field of the stator
- The rotor is pulled round, but rotates at a slower speed (=asynchronous)

Three-phase mains supply
50 Hz / 60 Hz:

Other names:

- Squirrel-cage motor
- Cage motor
- Asynchronous motor



Induction Motors - Number of Poles

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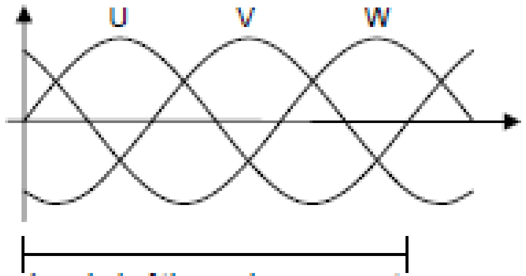
AC Induction Motor Slip Formula

$$slip = \frac{(n_s - n)}{n_s} * 100$$

n_s – *synchronous speed in rpm*

n – *rotational speed in rpm*

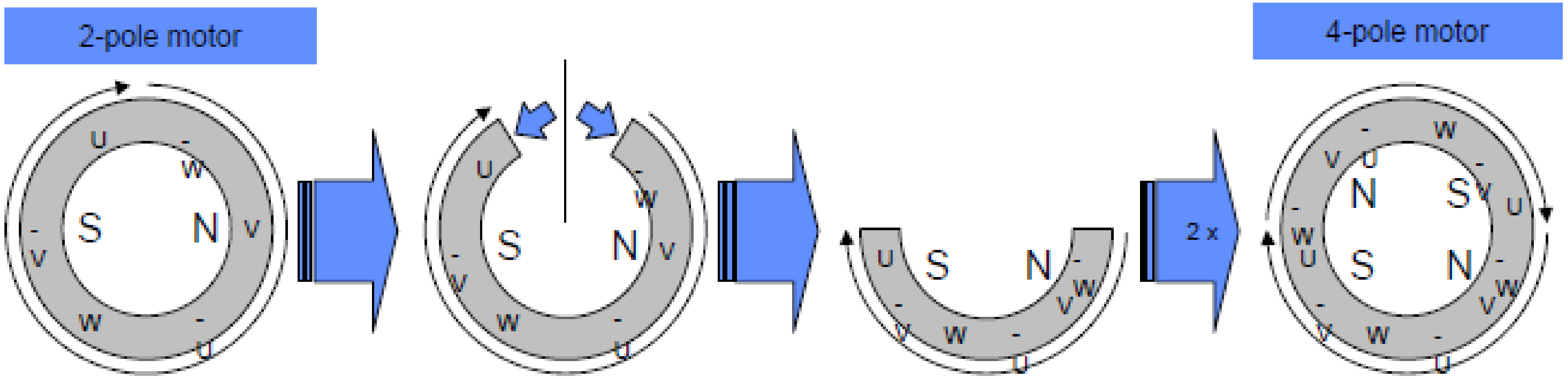


1 period of three-phase current
20 ms (at 50 Hz)

$$n_s = 2 \cdot \frac{f \cdot 60}{p}$$

	f = 50 Hz	f = 60 Hz
2-pole:	n_s = 3000 rpm	n_s = 3600 rpm
4-pole:	n_s = 1500 rpm	n_s = 1800 rpm
6-pole:	n_s = 1000 rpm	n_s = 1200 rpm
8-pole:	n_s = 750 rpm	n_s = 900 rpm

n_s	[1/min]	Synchronous speed
f	[Hz]	Frequency of current in stator
p	[-]	Pole number of motor

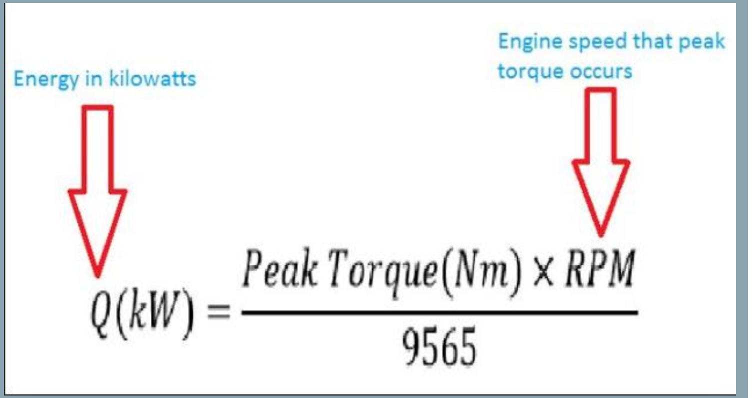


1 rotation of the magnetic field in the course of one period

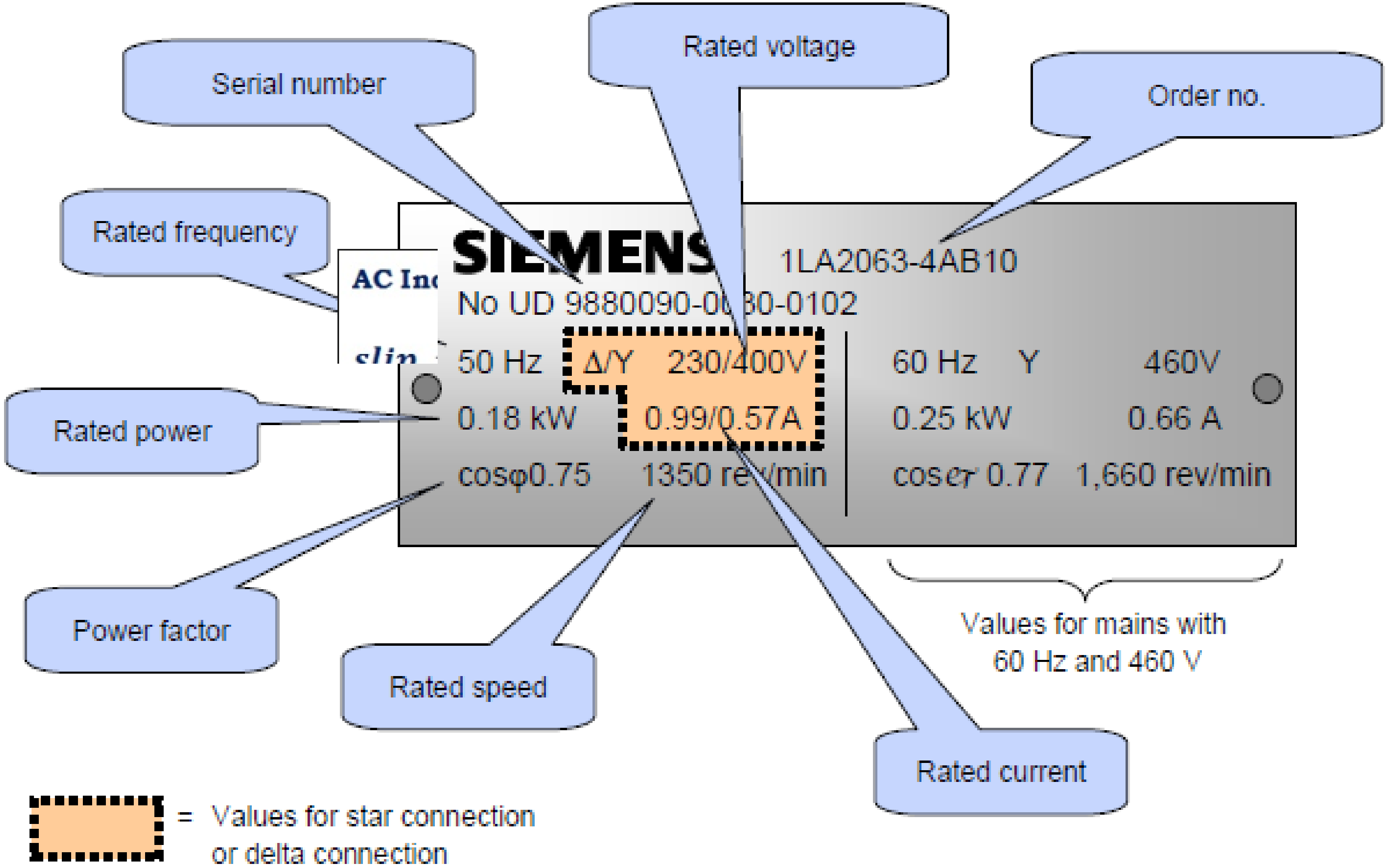
Imagine that the stator windings are compressed, so that they only cover half the circumference. The same windings are then fitted again onto the other half.

1 rotation of the magnetic field in the course of two periods

Motor Data



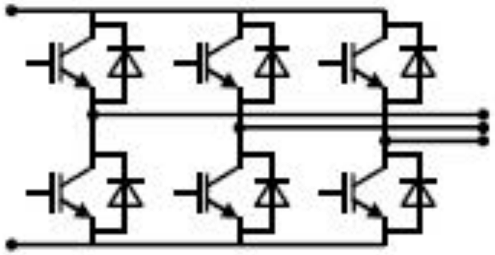
$$Q(kW) = \frac{Peak\ Torque(Nm) \times RPM}{9565}$$



= Values for star connection or delta connection

2. Basic of Drives and Controls

An **Ac drive** is a device that is used to control the speed of an electrical motor. The speed is controlled by changing the frequency of the electrical supply to the motor. Its also gives some addition protection to the motor.



Operation at mains supply

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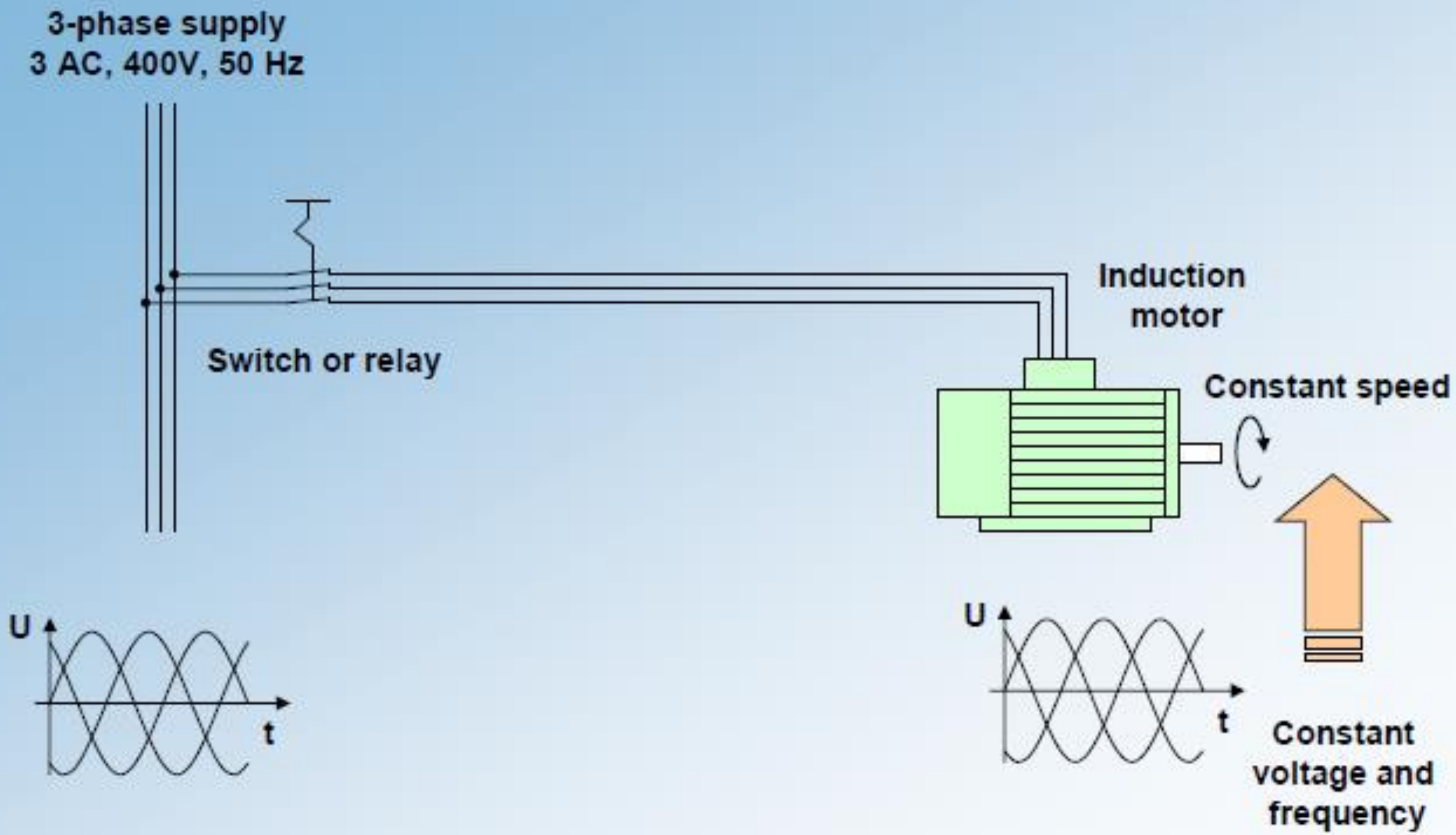

Operation with converter

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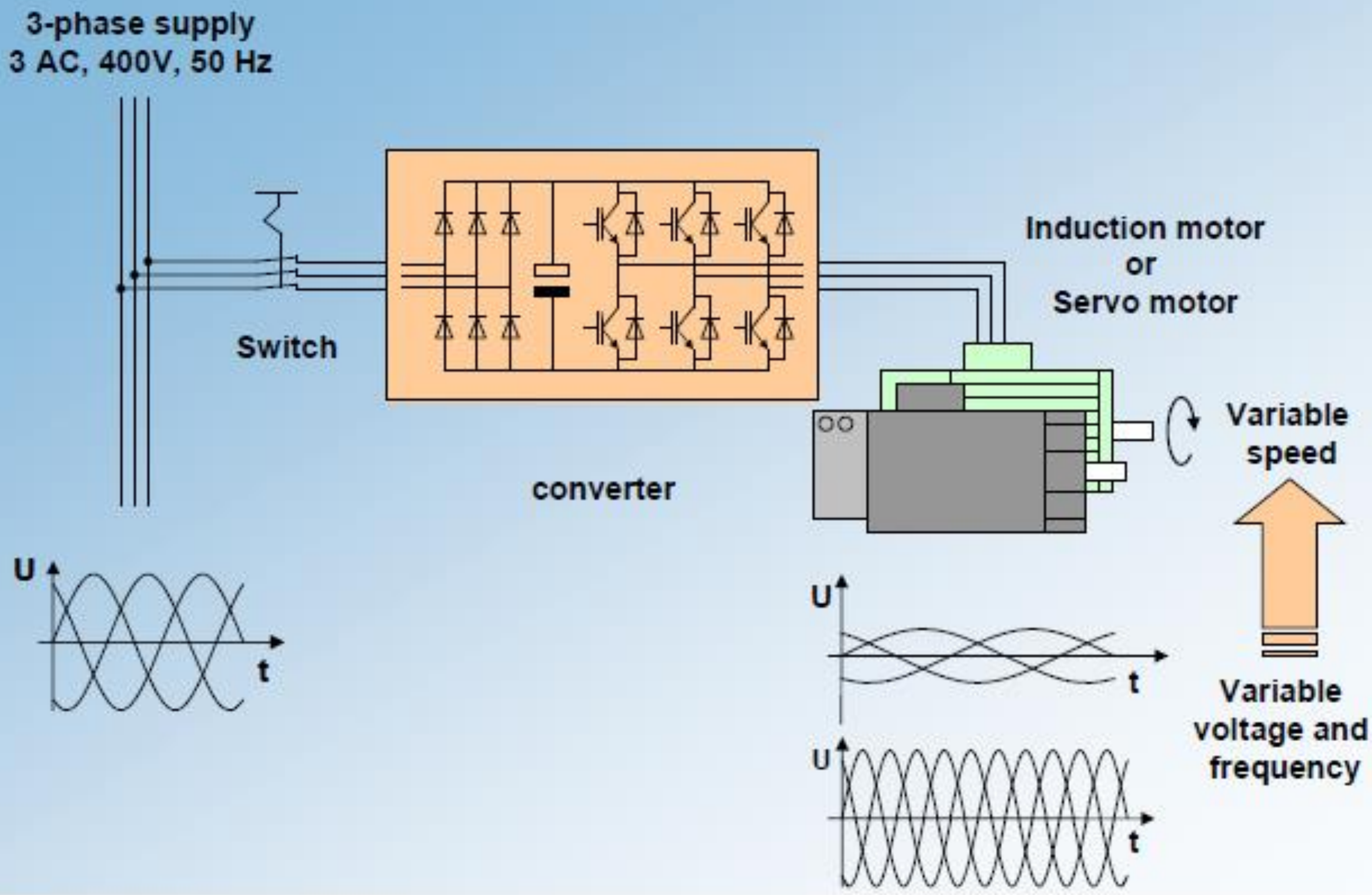

Principle of operation

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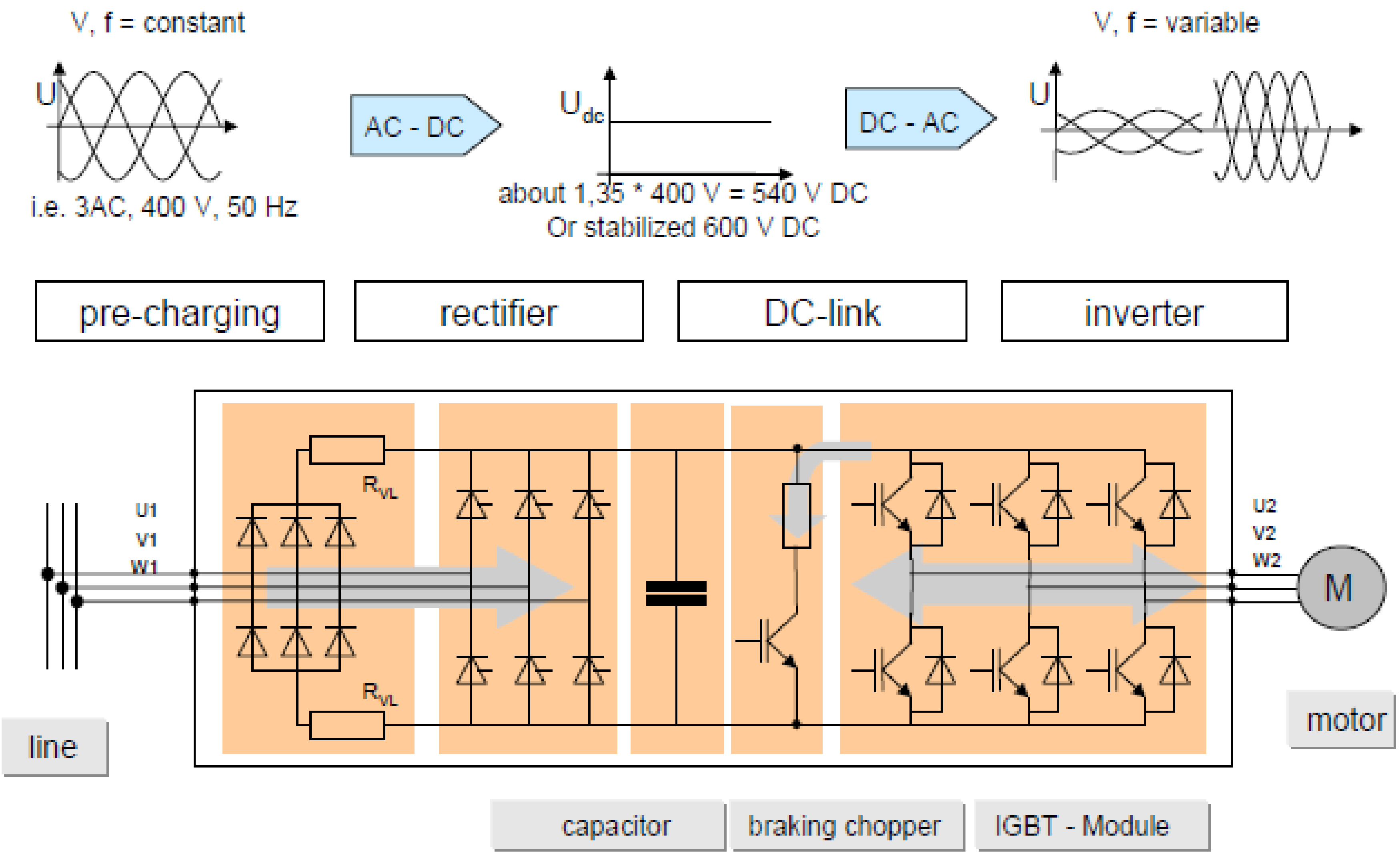


V, f = constant

i.e. 3AC, 400 V, 50 Hz

AC - DC

about 1,35 * 400 V = 540 V DC
Or stabilized 600 V DC

DC - AC

V, f = variable

pre-charging

rectifier

DC-link

inverter

line

capacitor

braking chopper

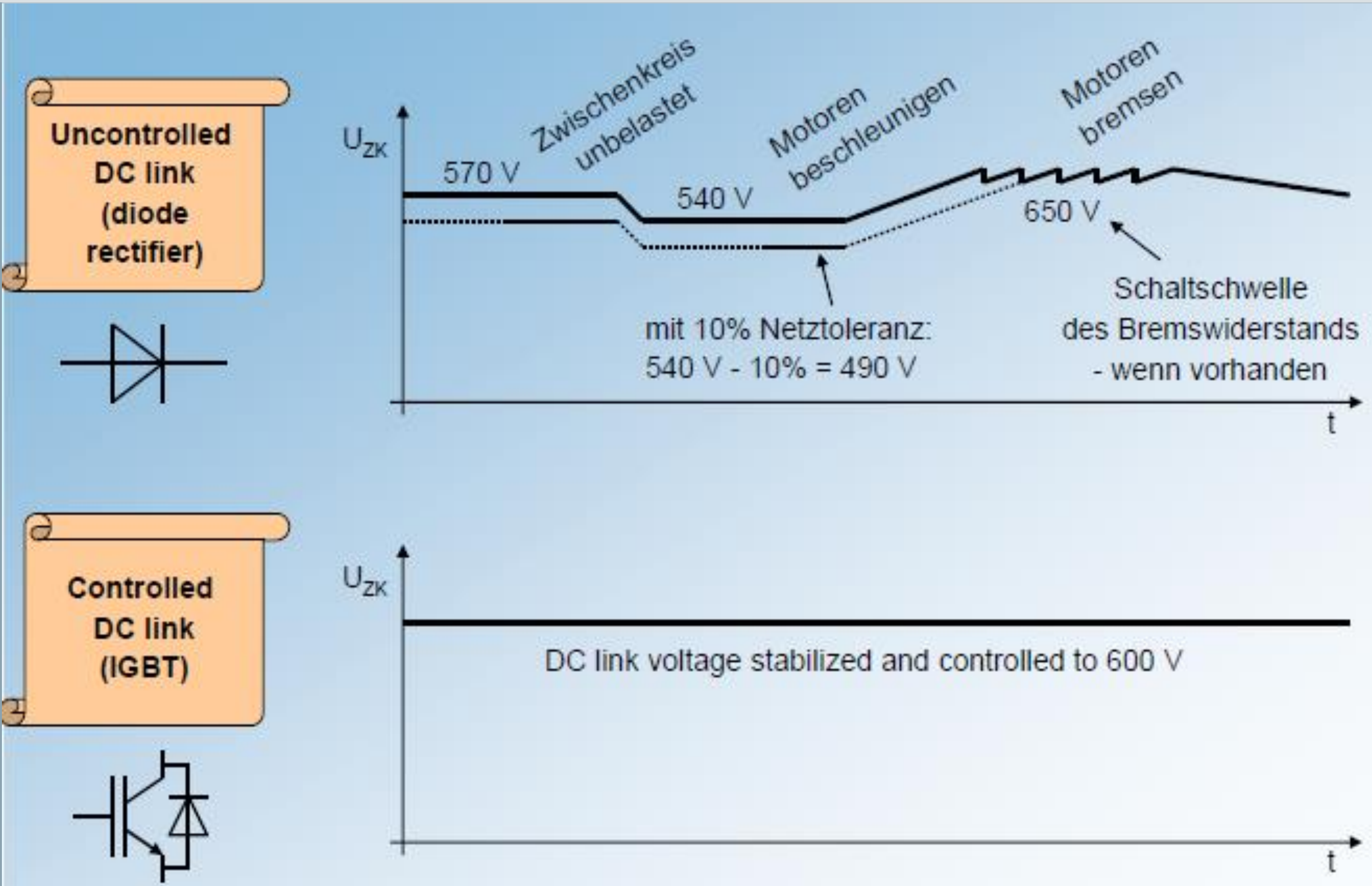
IGBT - Module

motor

DC link voltage

DC link voltage

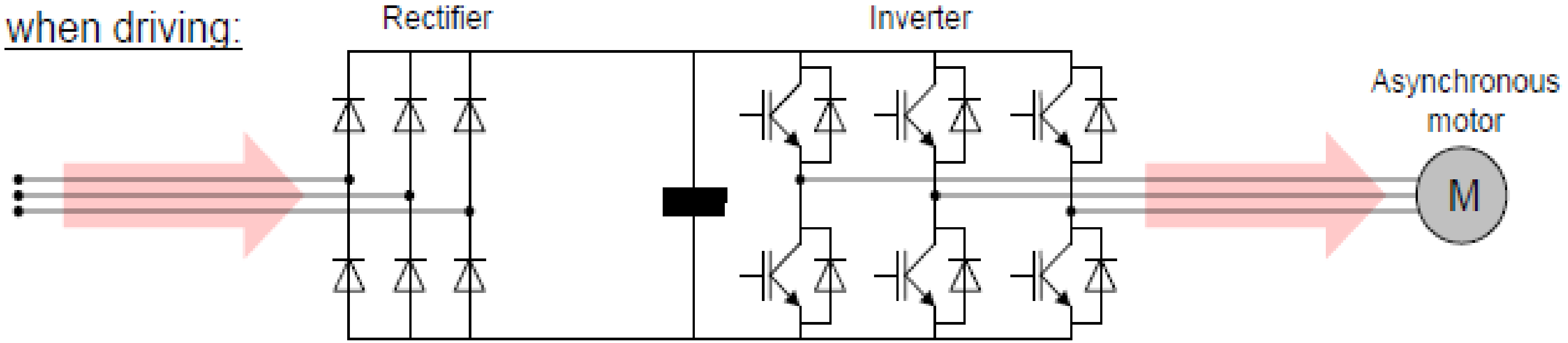
$$V_{DCLink} \approx 1.35 \cdot V_{Line}$$


Uncontrolled DC link (diode rectifier)
U_{ZK}
570 V
Zwischenkreis unbelastet
540 V
Motoren beschleunigen
Motoren bremsen
650 V
Schaltschwelle des Bremswiderstands - wenn vorhanden
mit 10% Netztoleranz: 540 V - 10% = 490 V
t
Controlled DC link (IGBT)
U_{ZK}
DC link voltage stabilized and controlled to 600 V
t

Driving and braking mode

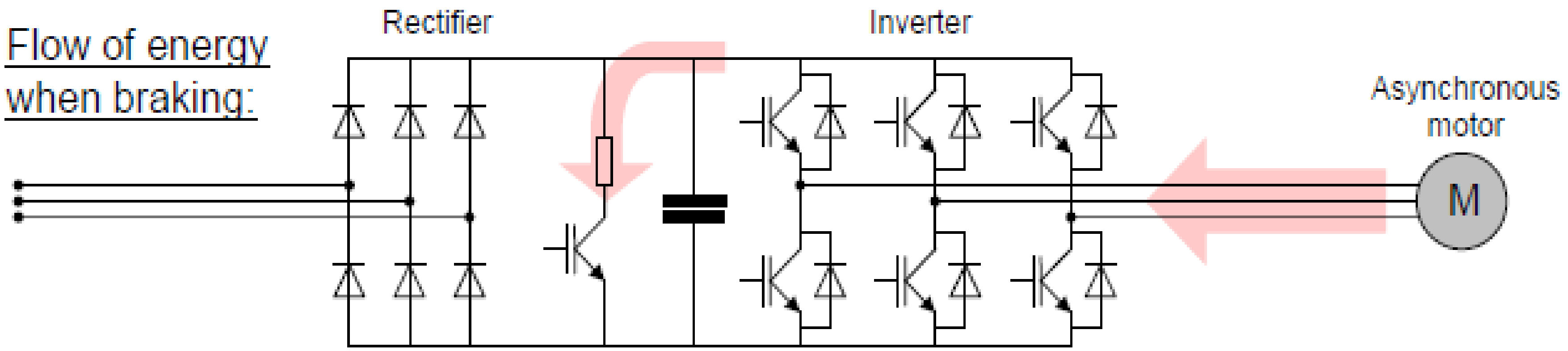
Driving (= motorized)

Flow of energy when driving:

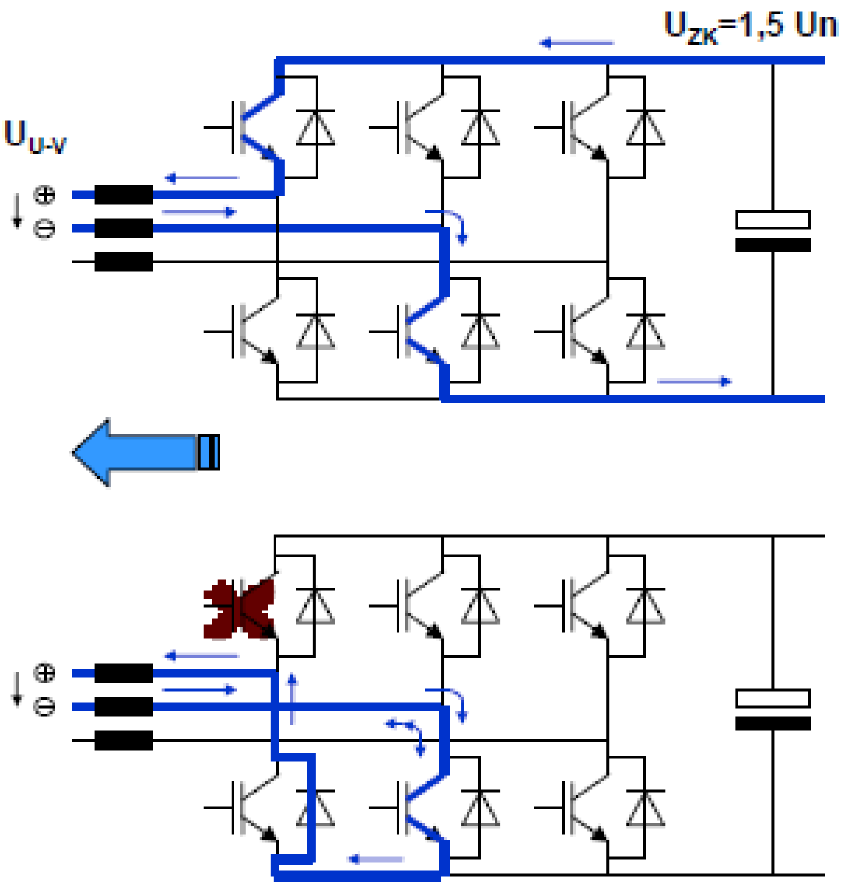


Braking (= regenerative)

Flow of energy when braking:



Regenerative operation



Simplified principle of operation:

1. At any moment the DC-link voltage is higher than the line voltage.
2. By switching on two transistors the positive and negative DC-link bus bar are connected to a matching line phase.
3. Energy is fed back to the line.
4. To control regeneration one transistor is switched off.
5. The step up reactor maintains the current flow through a matched free wheeling diode.
6. After 250 µs the discussed cycle restarts (pulse frequency 4 kHz).

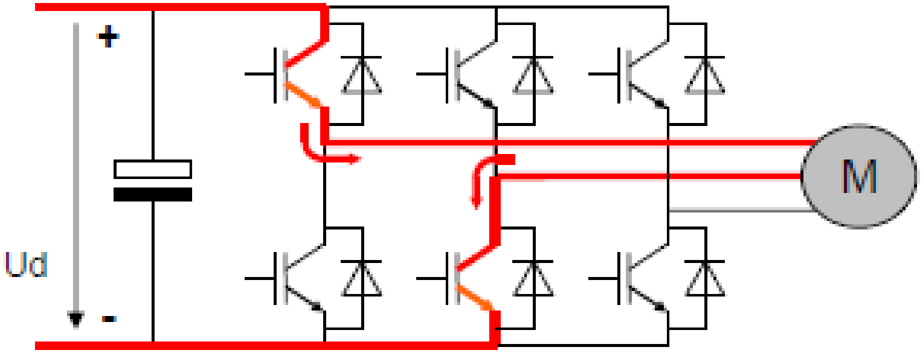
In regenerating operation the Active Line Module operates basically like the Motor Module in motor operation.

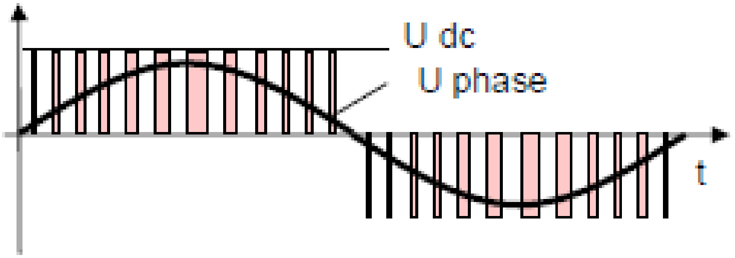
Inverter Module: Pulse-width-modulation

DC-link:
constant DC-voltage

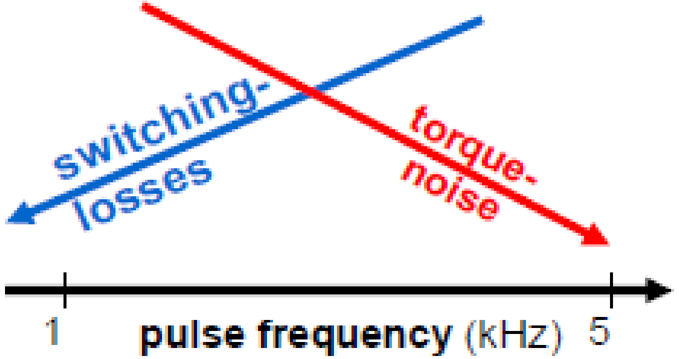
PWM

motor:
variable voltage and frequency





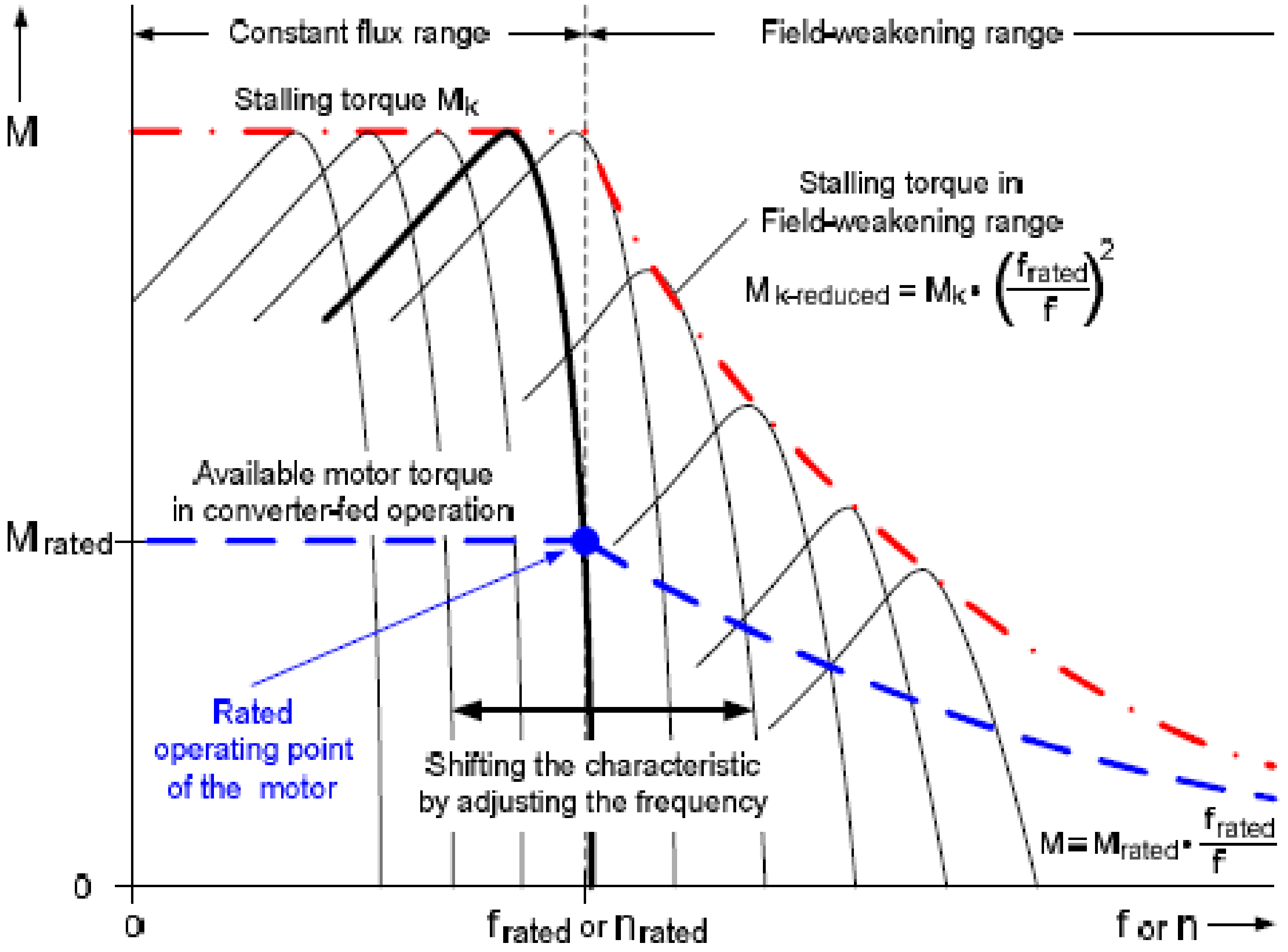
supply-voltage	Output power VT at 400/690V	**pulse frequency (fixed)**
380 – 480 V	110 – 250 kW	**2 (4) kHz**
	315 – 800 kW	**1.25 (2,5) kHz**
660 – 690 V	75 – 315 kW; 400--800kW	**1,25 (2,5) kHz**



Higher efficiency for general performance by: reduced pulse frequency!

Operation with converter

The speed/torque characteristic in **"bold"** print represents the motor's characteristic when it is operating directly on the mains supply at rated frequency frated and rated voltage Vrated.



Shifting the speed/torque characteristic of an asynchronous motor by adjusting frequency and voltage

Induction Motors - Characteristics for converter operation

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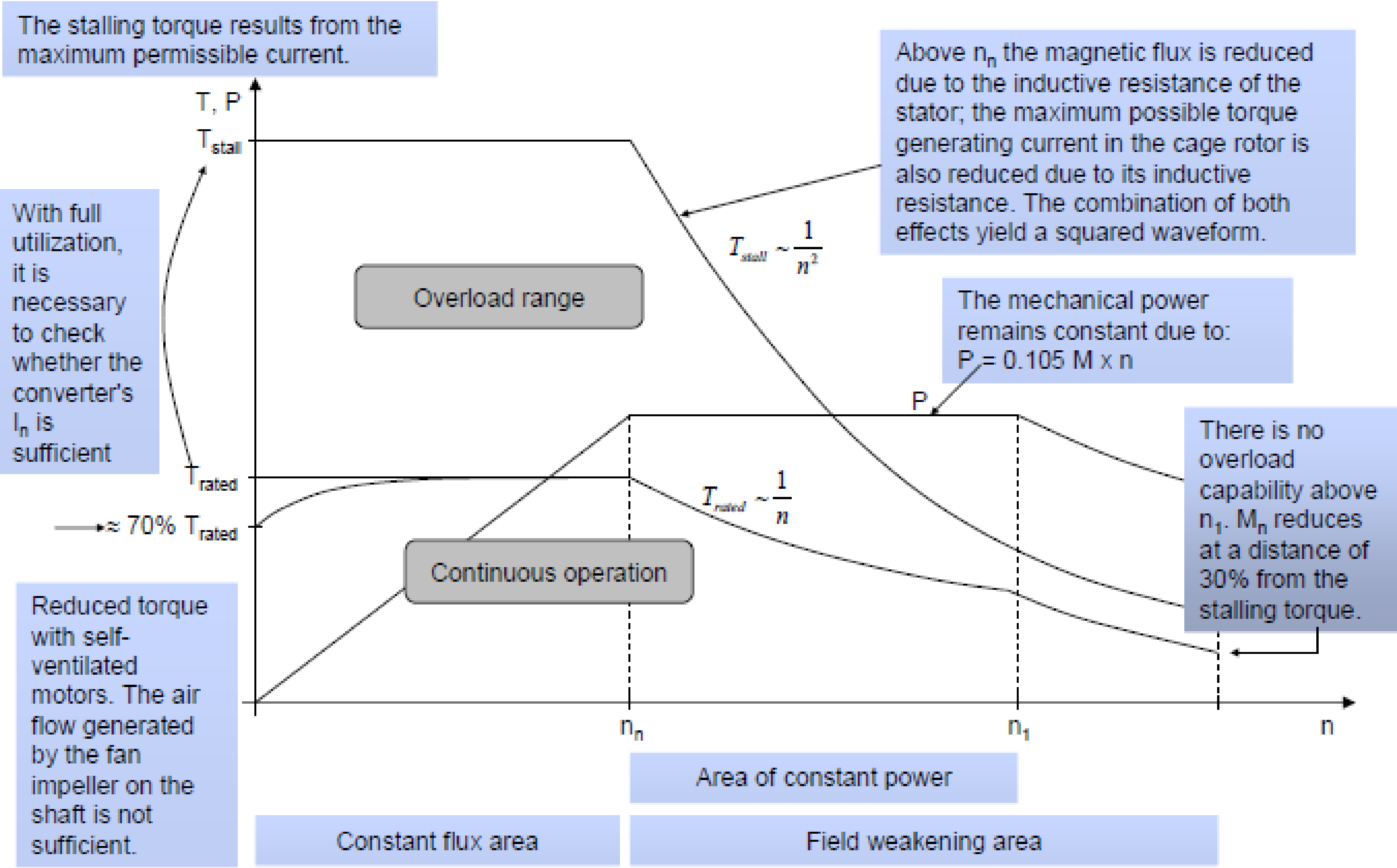


The stalling torque results from the maximum permissible current.

With full utilization, it is necessary to check whether the converter's I_n is sufficient

Reduced torque with self-ventilated motors. The air flow generated by the fan impeller on the shaft is not sufficient.

Above n_n the magnetic flux is reduced due to the inductive resistance of the stator; the maximum possible torque generating current in the cage rotor is also reduced due to its inductive resistance. The combination of both effects yield a squared waveform.

The mechanical power remains constant due to: P = 0.105 M x n

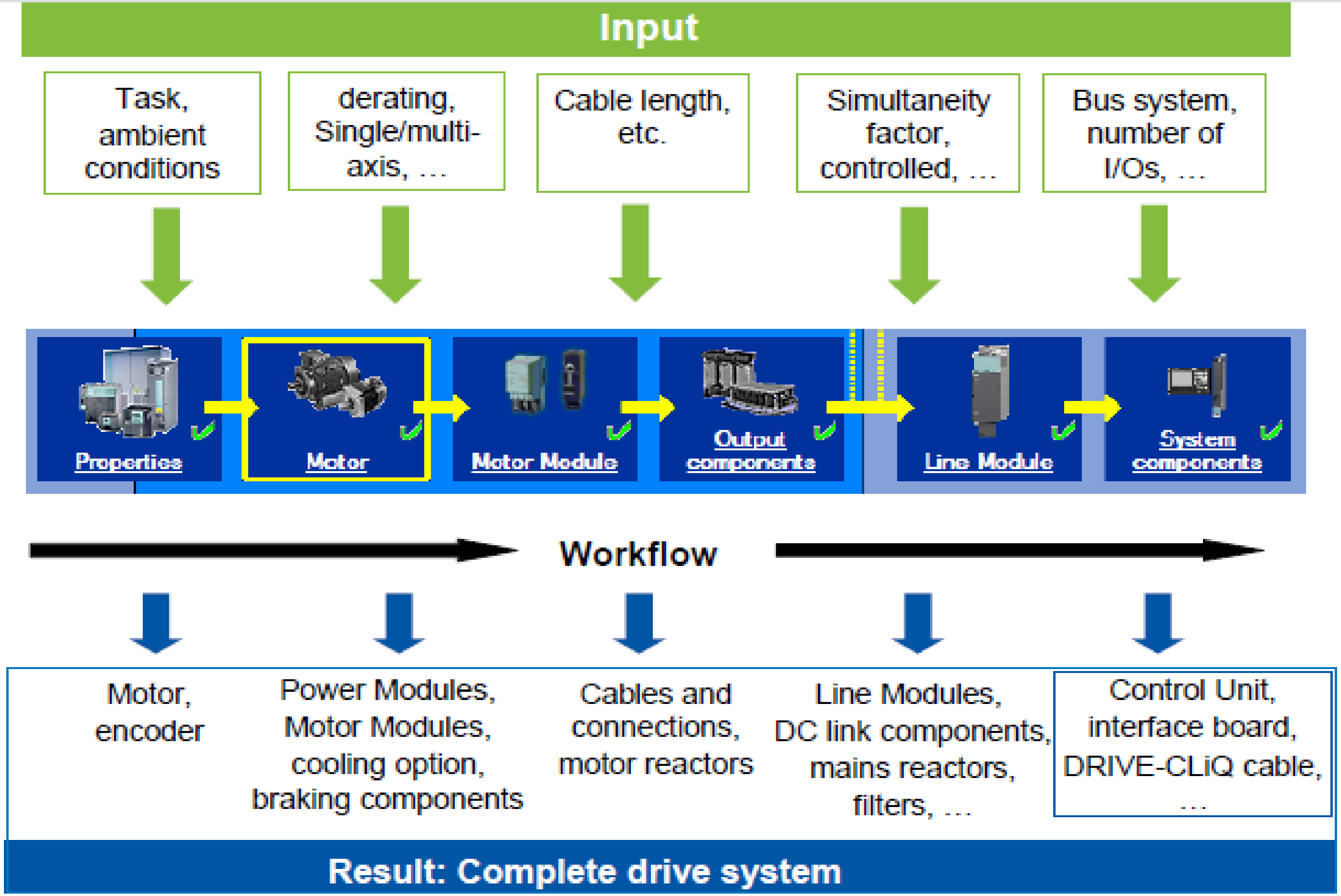
There is no overload capability above n_1. M_n reduces at a distance of 30% from the stalling torque.

Area of constant power

Constant flux area

Field weakening area

Configuring steps
Determination of the drive components



Input

Task, ambient conditions

derating, Single/multi-axis, …

Cable length, etc.

Simultaneity factor, controlled, …

Bus system, number of I/Os, …

Workflow

Motor, encoder

Power Modules, Motor Modules, cooling option, braking components

Cables and connections, motor reactors

Line Modules, DC link components, mains reactors, filters, …

Control Unit, interface board, DRIVE-CLiQ cable, …

Result: Complete drive system

Let’s Start

Sinamics S120

Innovative Drive
Technology

SINAMICS S120

For high performance / dynamic drive applications

Top-10 tech specs

1	**Format / Axes**		**Distributed** AC / AC Motor-integrated (S120M)	**Blocksize** AC / AC Single-Axis	**Chassis** AC / AC Single-Axis	**Booksize** DC / AC Multi-Axis	**Compact Booksize** DC / AC Multi-Axis	**Chassis** DC / AC Single-Axis
2	**Supply Voltages / Power Range**	1AC 200 – 240V ± 10%	—	0.16 – 1 HP (0.12 – 0.75 kW)		—	—	—
		3AC 380 – 480V ± 10%	0.75 – 2 HP (0.5 – 1.5 kW)	0.5 – 120 HP (0.37 - 90 kW)	150 – 340 HP (110 – 250 kW)	2 – 145 HP (1.6 – 107 kW)	1.2 – 13 HP (0.9 – 9.7 kW)	150 – 1,000 HP (110 – 800 kW)
		3AC 500 – 690V ± 10%	—	—	—	—	—	100 – 1,600 HP (75 – 1,200 kW)
3	**Control Methods**		V/Hz, Vector with/without encoder, Servo with/without encoder					
4	**Communication**		PROFINET, PROFIBUS DP, EtherNet/IP™, USS, CANopen, Modbus TCP/IP, pulse/direction interface					
5	**Functions**		• Flying restart circuit • Automatic restart • Basic positioner • Technology controller • Kinetic buffering • BICO technology • Drive Control Chart (DCC) • Motion control in conjunction with SIMOTION • Numeric control with SINUMERIK solution line					
6	**Motor Compatibility**		Synchronous	Induction, synchronous, torque, linear				
7	**Degree of Protection**		IP65	IP20	IP20, IP43 opt.	IP20	IP20	IP00 / IP20
8	**Commissioning / Configuration**		STARTER, Startdrive, SIZER, DT Configurator					
9	**Safety Technology**		• Safe Torque Off • Safe Operating Stop • Safe Stop 1 • Safe Stop 2 • Safe Brake Control • Safely-Limited Speed • Safe Brake Test • Safe Speed Monitor • Safe Direction • Safely-Limited Position • Safely Position					
10	**Standards Compliance**		UL508C, CSA C22.2 No. 14, cULus					

SINAMICS S120

Positioning in the SINAMICS AC LV drives family

Categories wise

	V-Series Value	**G-Series** General	**S-Series** System
Features	• Basic performance • Ease of use • Ruggedness	• Efficient general performance • Range of applications • High usability	• High performance • Highest functionality • Flexibility
Closed-loop Control Perfomance	■	■■	■■■
Integration into Automation Systems	■	■■■	■■■
Energy Recovery Topology	—	■■	■■■
Integrated Safety Functions	—	■■	■■■

Positioning in the SINAMICS AC LV drives family

Configuration and function wise

		Installation			Control			Specialized Function		Communication	
Performance	SINAMICS	Component	Distributed	Enclosed	V/Hz	Vector	Servo	Positioning	Multi-Axis / Common DC	PROFINET	EtherNet/IP
Basic	V20	✓			✓						
Standard Performance	G110D		✓		✓						
	G110M		✓		✓	✓				✓	✓
	G120C	✓			✓	✓				✓	✓
	G120	✓			✓	✓		✓		✓	✓
	G120D		✓		✓	✓		✓		✓	✓
	G120E			✓	✓	✓		✓		✓	✓
	G130	✓			✓	✓				✓	✓
	G150			✓	✓	✓				✓	✓
High Performance / Servo	S110	✓					✓	✓		✓	
	S120	✓			✓	✓	✓	✓	✓	✓	✓
	S120M		✓		✓	✓	✓	✓	✓	✓	✓
	S120 CM			✓	✓	✓	✓	✓	✓	✓	✓
	S150			✓	✓	✓				✓	✓

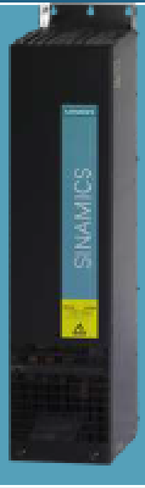
Positioning in the SINAMICS AC LV drives family

Features wise

Performance	SINAMICS	Pump, Fan, Compressor Focus	Safety Integrated	Power Regeneration	Active Front End	Liquid Cooled Option	Low Harmonics	Seismic Certified
Basic	V20	✔						
Standard Performance	G110D							
	G110M	✔	✔					
	G120C		✔					
	G120		✔	✔				
	G120D		✔	✔				
	G120E	✔	✔	✔			✔	✔
	G130	✔	✔					
	G150		✔			✔		
High Performance / Servo	S110		✔					
	S120		✔	✔	✔	✔	✔	
	S120M		✔	✔	✔	✔		
	S120 CM		✔	✔	✔		✔	
	S150		✔	✔	✔		✔	

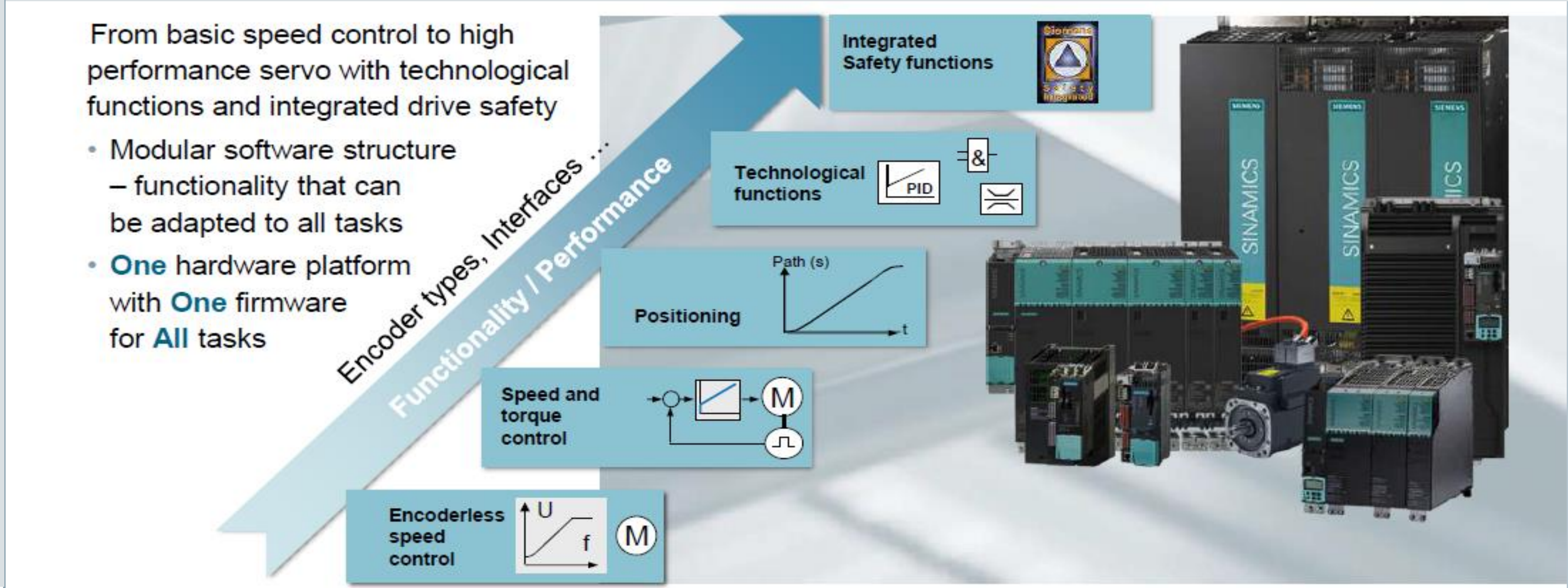
SINAMICS S120

More formats for more flexibility

Single-Axis	Single or Multi-Axis	Multi-Axis		
Blocksize AC / AC	 **Chassis** AC / AC	**Booksize** DC / AC	**Booksize Compact** DC / AC	**Distributed** DC / AC
• Modular design with integrated control unit and power module • A Control Unit Adapter allows integration to multi-axis control unit	• From 150 HP (100kW) Available as • Power module (AC / AC) • Infeed module (AC / DC) • Motor module (DC / AC)	• Optimized for multi-axis applications and interconnected via common DC link • Comprised of a control unit (e.g. CU320-2, SIMOTION, SINUMERIK) as well as infeed and motor modules	• Virtually same performance and benefits as Booksize format yet requires less space	• Combines synchronous servomotor / encoder with integrated power section (Motor Module), directly integrated in the driven axis • Reduces cabling and cabinet space

Product overview

- As a result of its flexible modularity, the SINAMICS S120 can be scaled to address an extremely wide range of high-performance drive applications
- SINAMICS S120 sets the standard when it comes to dynamic performance, axis coordination, torque and positioning accuracy
- For applications in motion, continuous material webs and cyclic, high-speed processes such as with presses, converting, roller feeds and packaging machines

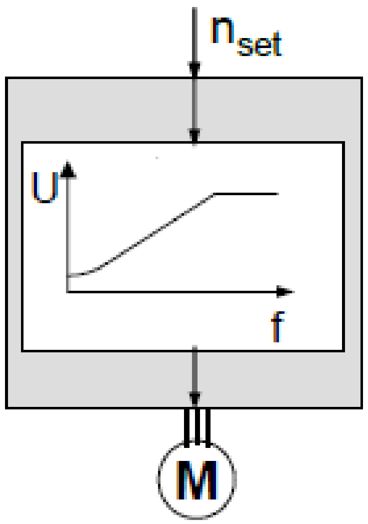


From basic speed control to high performance servo with technological functions and integrated drive safety

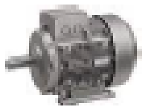
- Modular software structure – functionality that can be adapted to all tasks
- One hardware platform with One firmware for All tasks

Control modes

V/f control

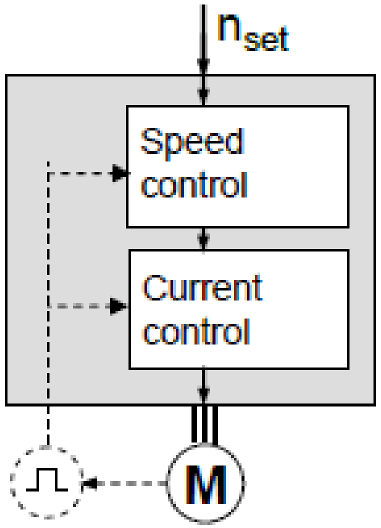


- for induction and reluctance motors
- encoderless

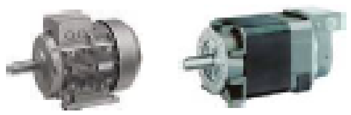


Basic speed control

Vector control

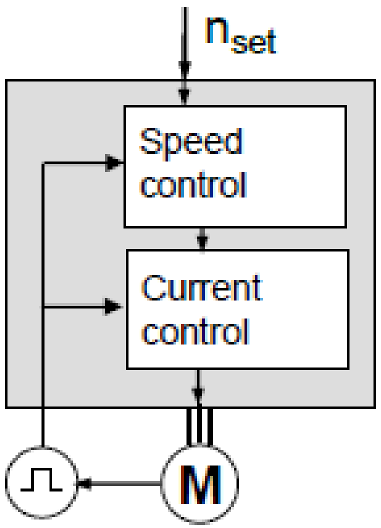


- for induction motors
- with or **without** encoder



High speed and torque constancy

Servo control



- for synchronous, induction, linear and torque motors
- with encoder (**induction motors also without encoder!**)

High dynamic response and accuracy

Applications

Performance single drives

- Centrifuges
- Travel drives
- Elevators
- Extruders
- Mixers
- Kneaders

Coordinated drives

Muli-Motor drives, e.g. in:

- Paper machines
- Rolling mill lines
- Foil and film machines
- Chemical fiber plantsz

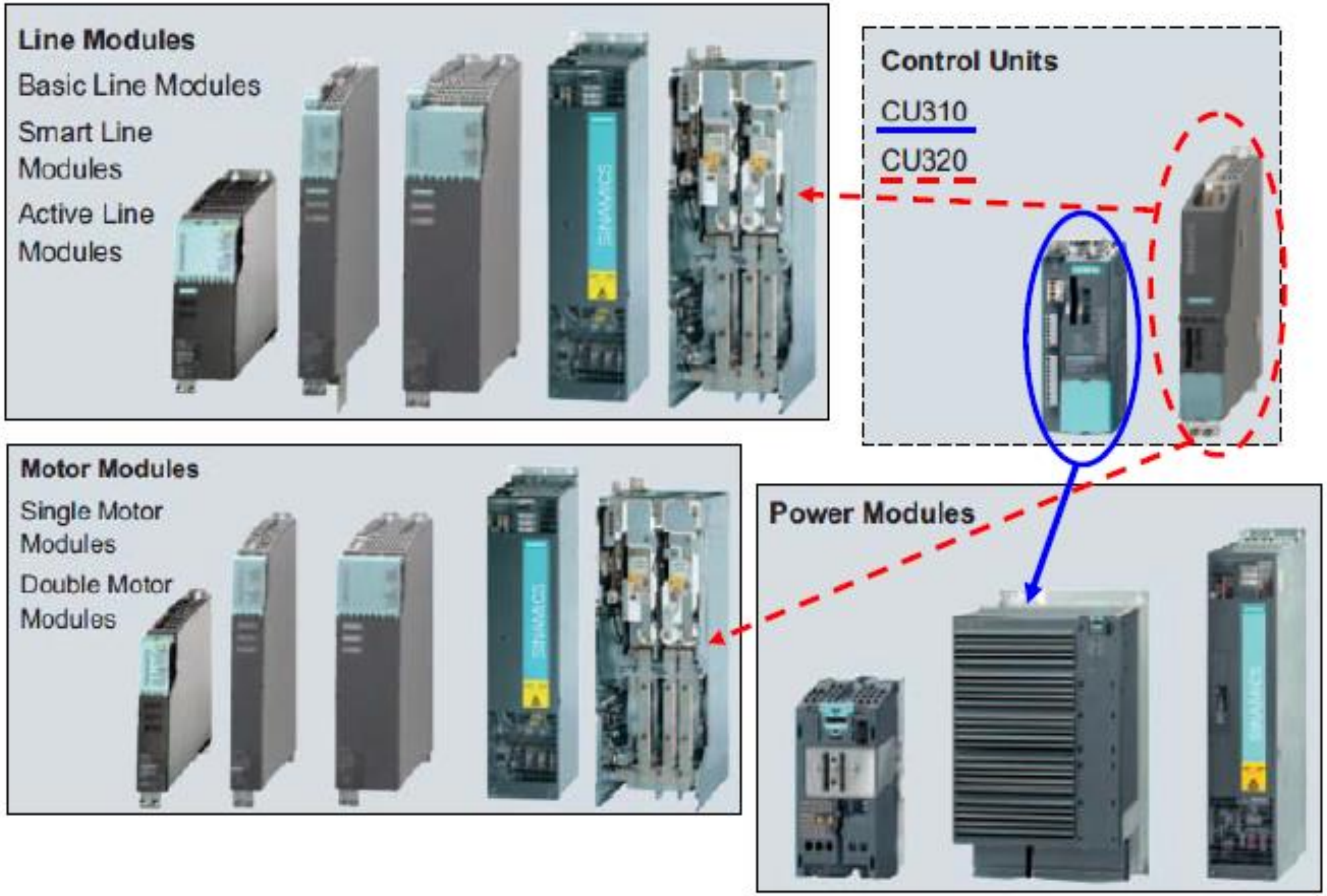
Servo drives

Positioning and Motion Control applications, e.g. in:

- Packing machines
- Printing presses
- Handling
- Weaving machines

Sinamics S120 is the answer for all demanding drive applications

Sinamics S120 Hardware Components



Sinamics S120 Hardware Components

SIEMENS

Sensor Modules
Terminal Modules
DRIVE-CLiQ Hub

Synchronous motors
- 1FT6 motors
- 1FT7 motors
- 1FK7 motors
- 1FS6 motors
- 1FW3 torque motors
- Gear units
- Geared motors
- Linear motors

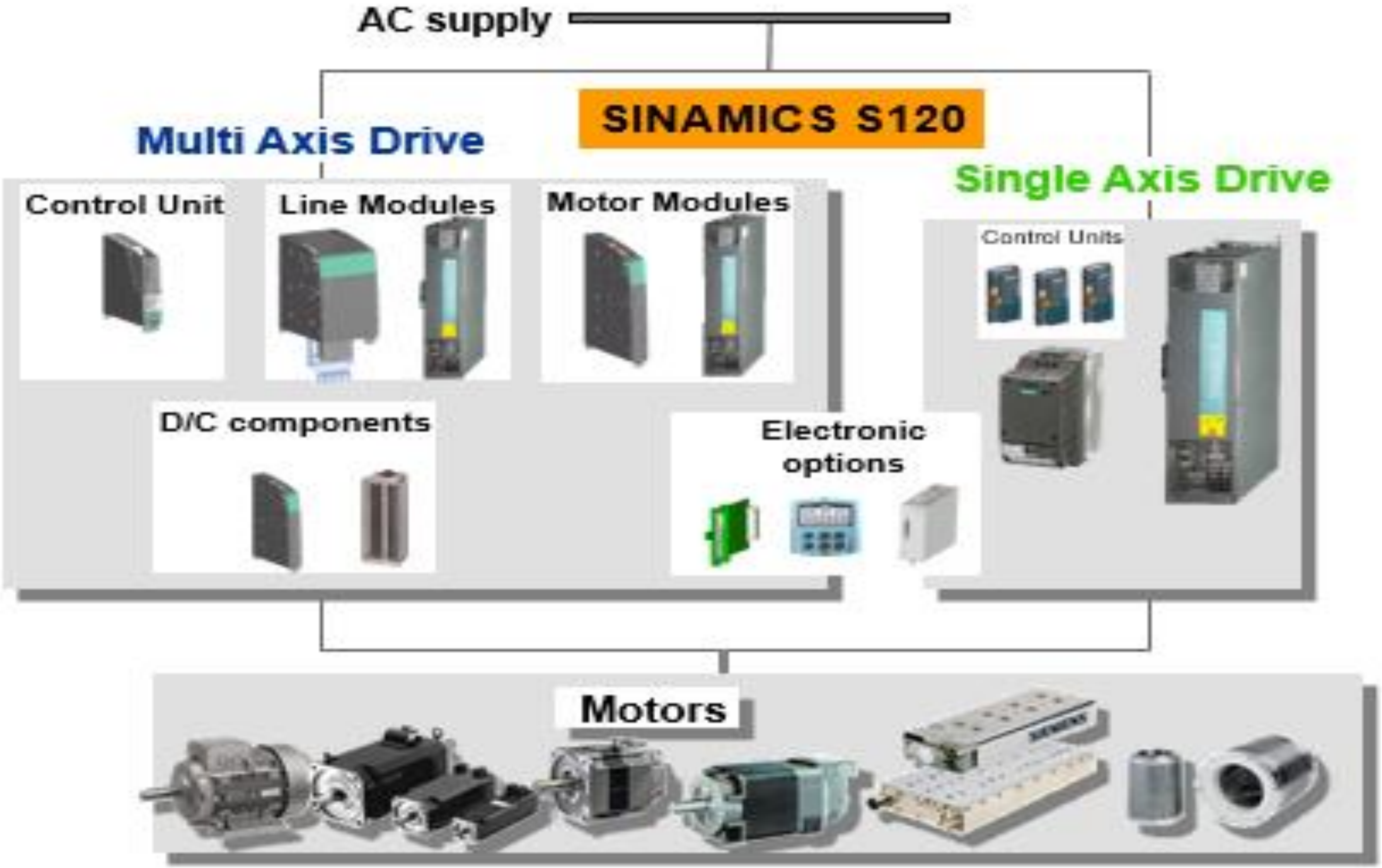
Line-side components
- Line reactors
- Line filters
- Active Interface Modules

Load-side components
- Motor reactors
- Sinusoidal filters

DC link components
- Braking Module
- Braking resistors
- Capacitor Module
- Control Supply Module

SINAMICS S120

System overview



AC supply

SINAMICS S120

Multi Axis Drive

Control Unit

Line Modules

Motor Modules

D/C components

Electronic options

Single Axis Drive

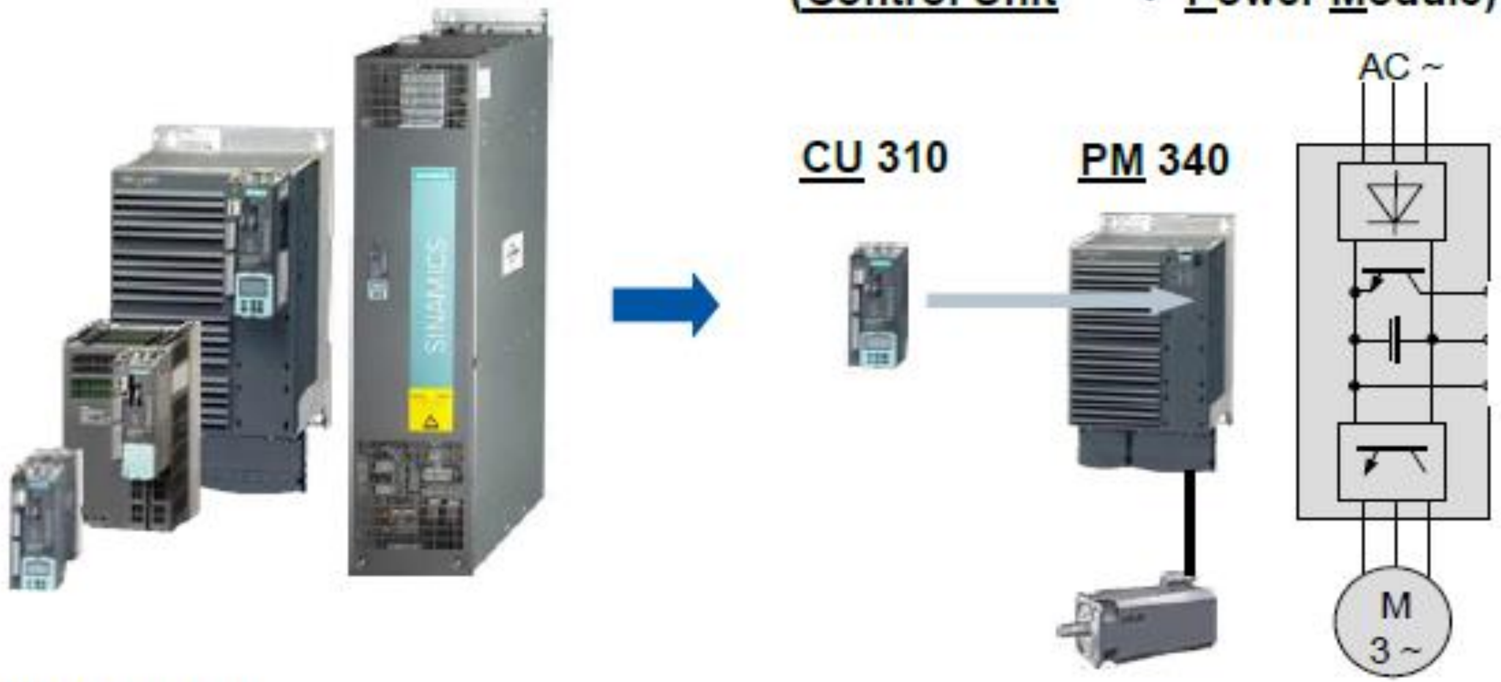
Control Units

Motors

Single-Axis Drive Configuration

Single-axis drive = Controller + Converter

(Control Unit + Power Module)



Power Modules:

- Can be connected to TN / IT / TT line supplies
- Line voltage 1x230 V AC (0.12 – 0.75 kW) resp. 3x400 V AC (0.37 - 250 kW)
- Uncontrolled infeed and internal DC link
- Integrated braking chopper, external braking resistor
- Optionally integrated line filter (C2 acc. to EN61800-3)

Single-axis control unit CU310-2

Functions

- **Easy positioner EPos**
  - Easy positioner solves clearly structured and simple motion control tasks on the drive without additional external technology
- **Drive Control Chart (DCC)**
  - Extends the unit functionality through freely available control, calculating and logic blocks for simple, graphic configuring of drive-specific control / logical and calculating functions
- **PID technology controller**
  - Control loop feedback – e.g. filling level, temperature, tension, pressure, flow and dancer position controls
- **Multiple standard functions**
  - Setpoint specification, data set switchover, controller optimization, kinetic buffering, etc.

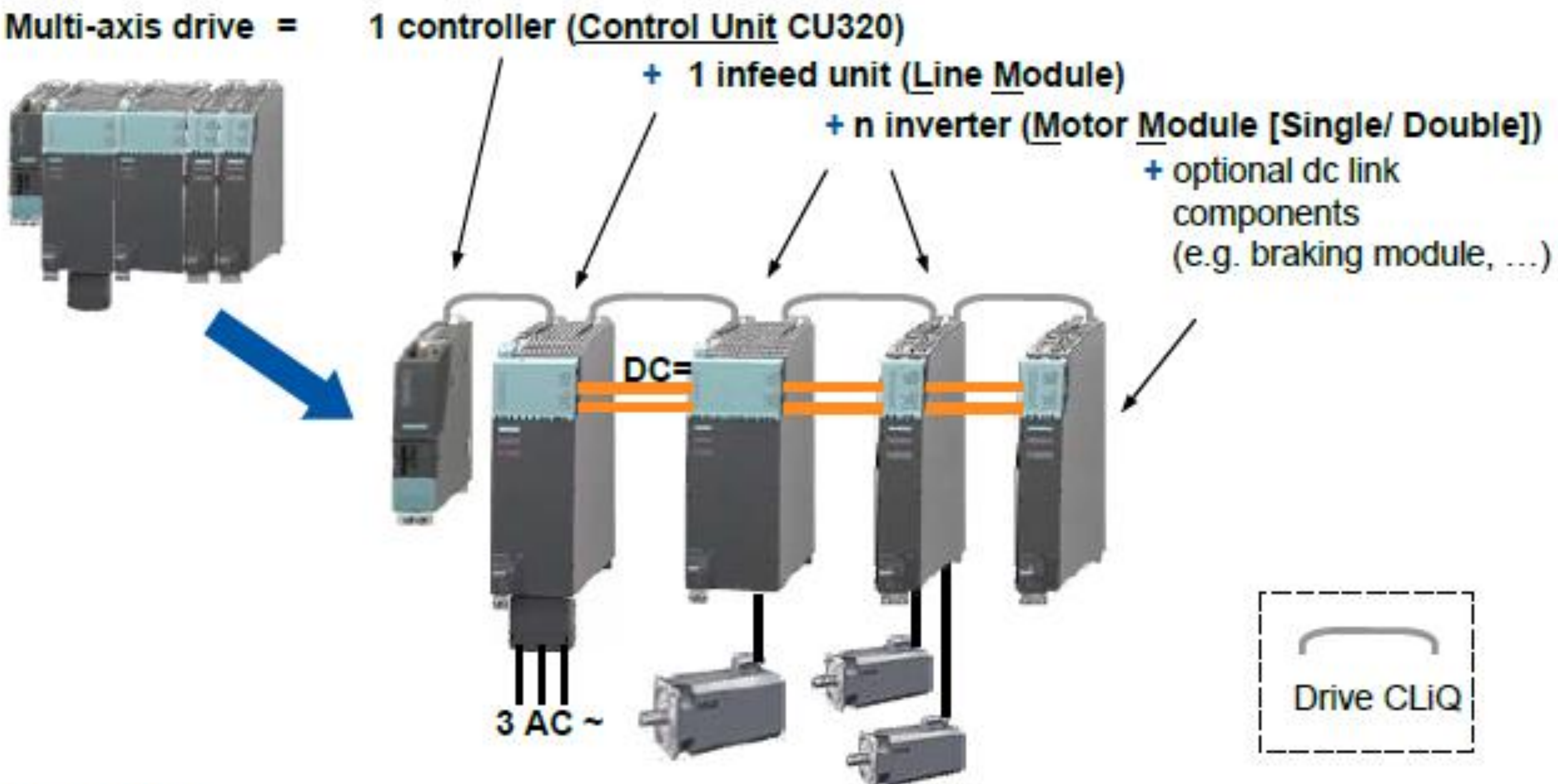
Communication

- PROFINET
- PROFIBUS DP
- USS
- SINAMICS Web Server

Motor control

- Servo / vector control for
  - Synchronous
  - Asynchronous (induction)
  - Linear
  - Torque

Multi-Axis Drive Configuration



Multi-axis drive = **1 controller (Control Unit CU320)**

+ 1 infeed unit (Line Module)

+ n inverter (Motor Module [Single/ Double])

+ optional dc link components (e.g. braking module, …)

Control Unit:

- One Control Unit for max. 8 drives
- Central diagnosis for controller, infeed unit, inverter and encoder / motors
- One memory card for firmware and all drive group parameters

Motor Modules:

- Available as Single or Double Motor Module

Multi-axis drives
Infeed and regenerative feedback

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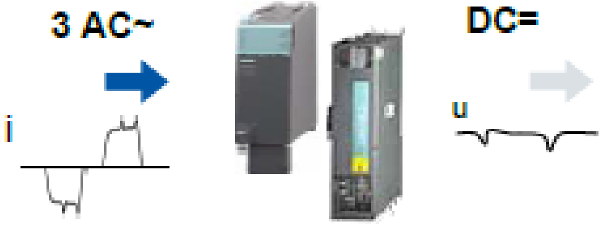
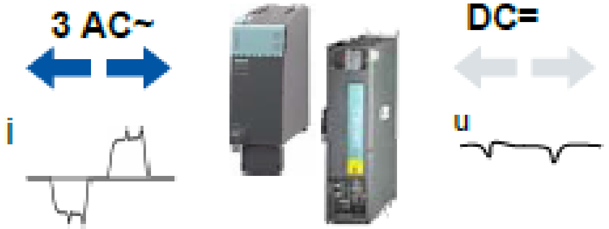
Basic Line Module



- Infeed only
- Line voltages:
  3 AC 380…480V, 3 AC 500…690V
- Can be diagnosed
- Higher efficiency with cosφ >0.96
- Diode Bridge in Forward Direction

Smart Line Module

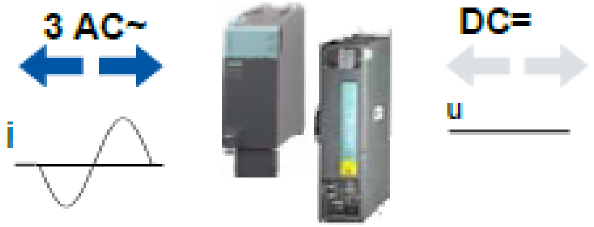


Same as Basic Line Module, *PLUS:*

- Stable due to IGBT technology
- Higher efficiency with cosφ >0.96
- Braking energy regeneration
- Diode Bridge in Forward & IGBT Bridge in Regenerative Direction

---

Active Line Module

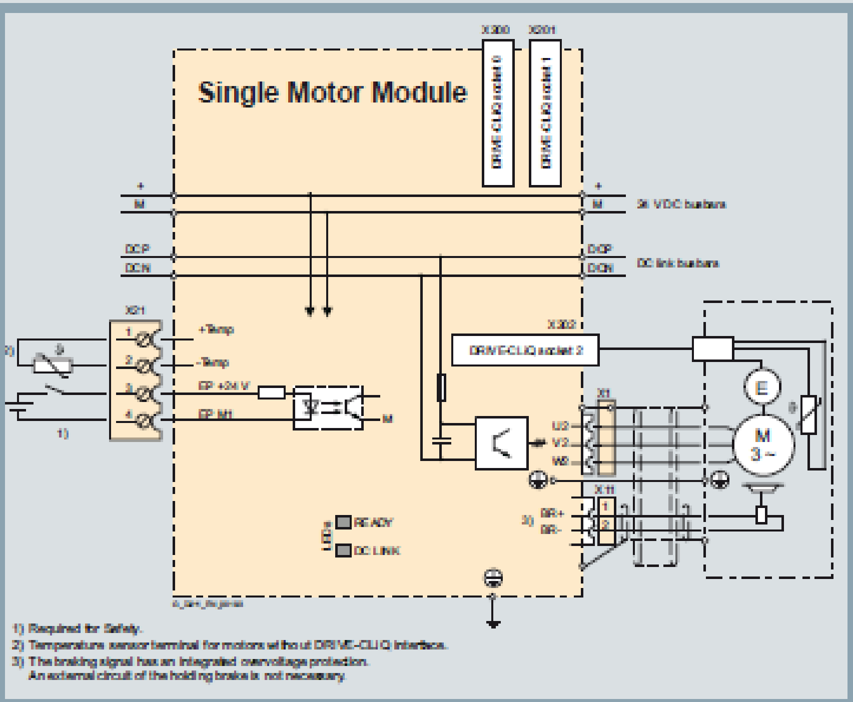


Same as Smart Line Module, *PLUS:*

- Controlled, higher and stable dc link voltage
- Controlled regeneration
- Superior energy efficiency (cosφ = 1)
- IGBT Bridge in Forward & Regenerative Directions

Multi-axis drives
Motor Modules

SIEMENS

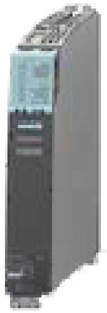


1) Required for Safety.
2) Temperature sensor terminal for motors without DRIVE-CLiQ interface.
3) The braking signal has an integrated overvoltage protection.
An external circuit of the holding brake is not necessary.

Single Motor Modules (1 Inverter in Single Unit)

- For rated output currents up to 200 A

- **Single Motor Modules**: Single-axis variant
  - Booksize compact format with rated output currents of 3 A to 18 A
  - Booksize format with rated output currents of 3 A to 200 A
  - Chassis format with rated output currents of 85 A to 1405 A

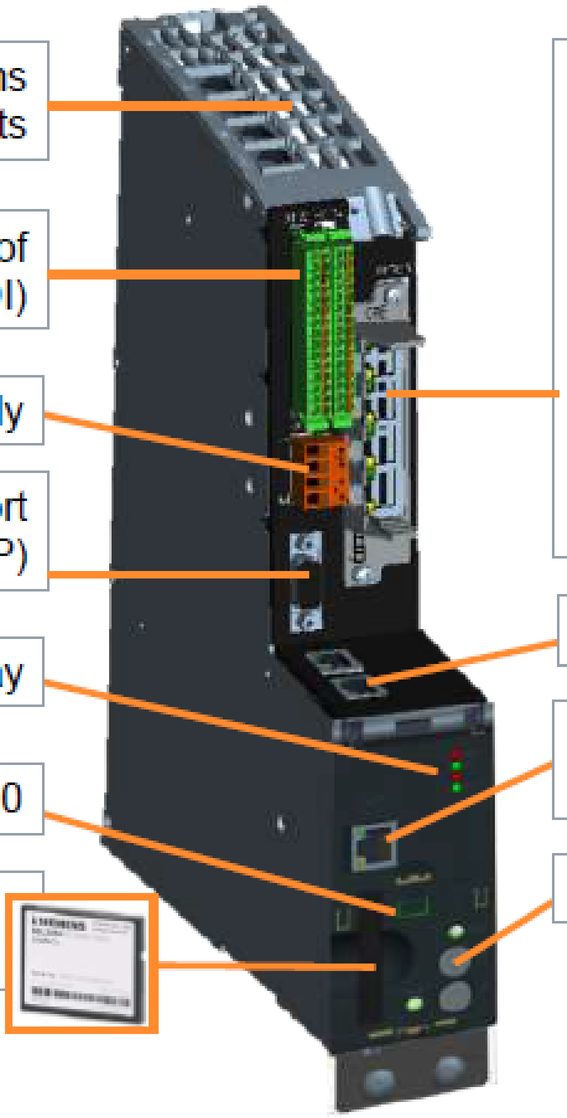


Double Motor Modules

- Space saving version for two motors (2 Inverters in Single Unit)
- For rated output currents up to 18 A

- **Double Motor Modules**: Two-axis variant
  - Booksize compact format with rated output currents of 1.7 A to 5 A
  - Booksize format with rated output currents of 3 A to 18 A

Control Unit



4 DRIVE-CLiQ ports for communications with the drive's components

12 digital inputs 8 bi-directional DI/DO (of which, 4 fast DI)

24V DC electronics power supply

PROFIBUS port (CU320-2 DP)

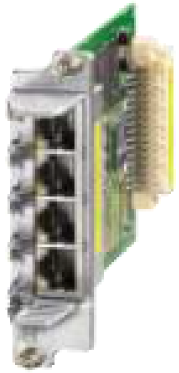
LED status display

interface for AOP30

CompactFlash Card slot for firmware and selected parameters

Expansion slot, such as for CBE20 Communications Board Ethernet

- PROFINET IO
- EtherNet/IP™
- SINAMICS Link
- Ethernet TCP/IP

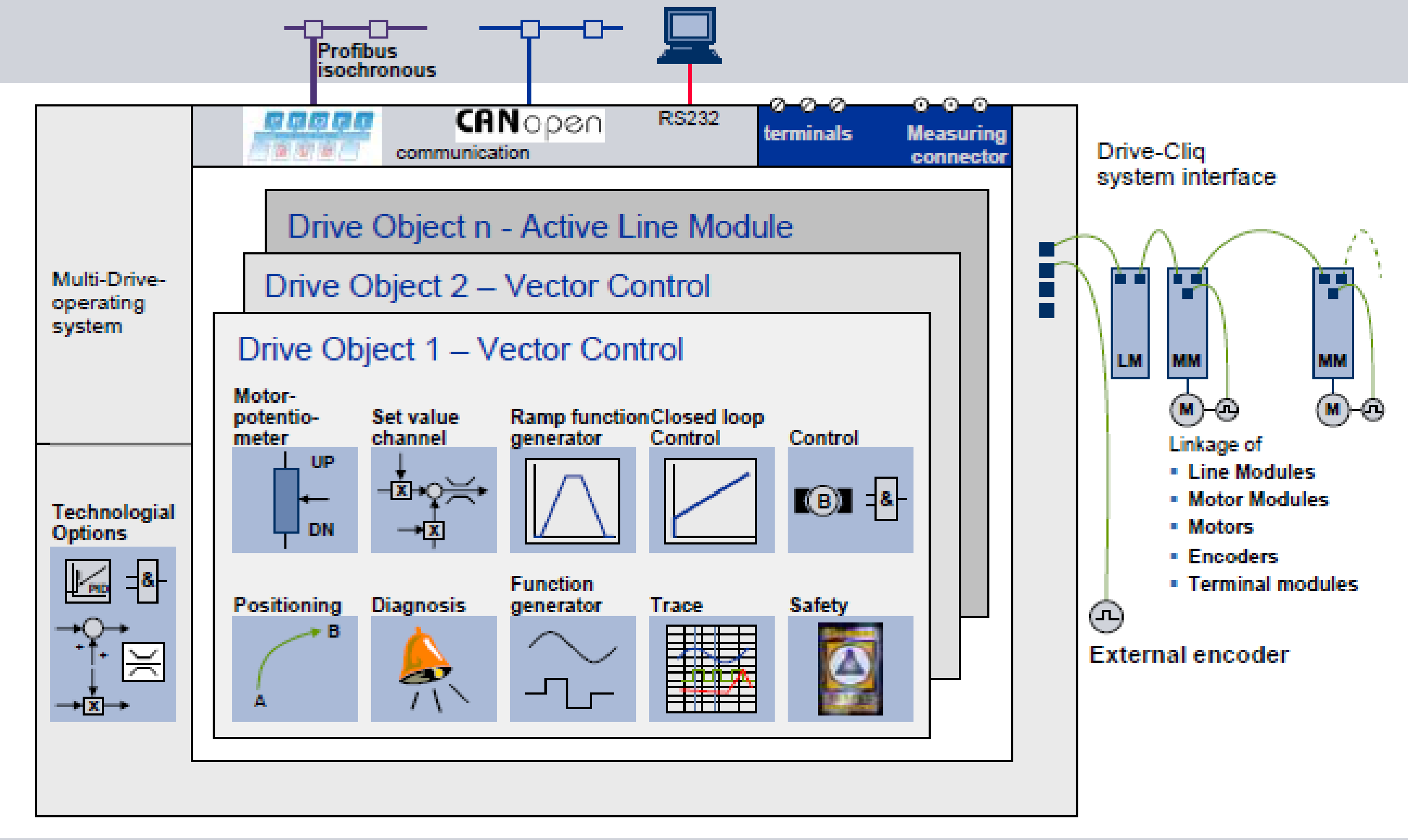


PROFINET interface (CU320-2 PN)

Ethernet programming port for connection of PC with STARTER

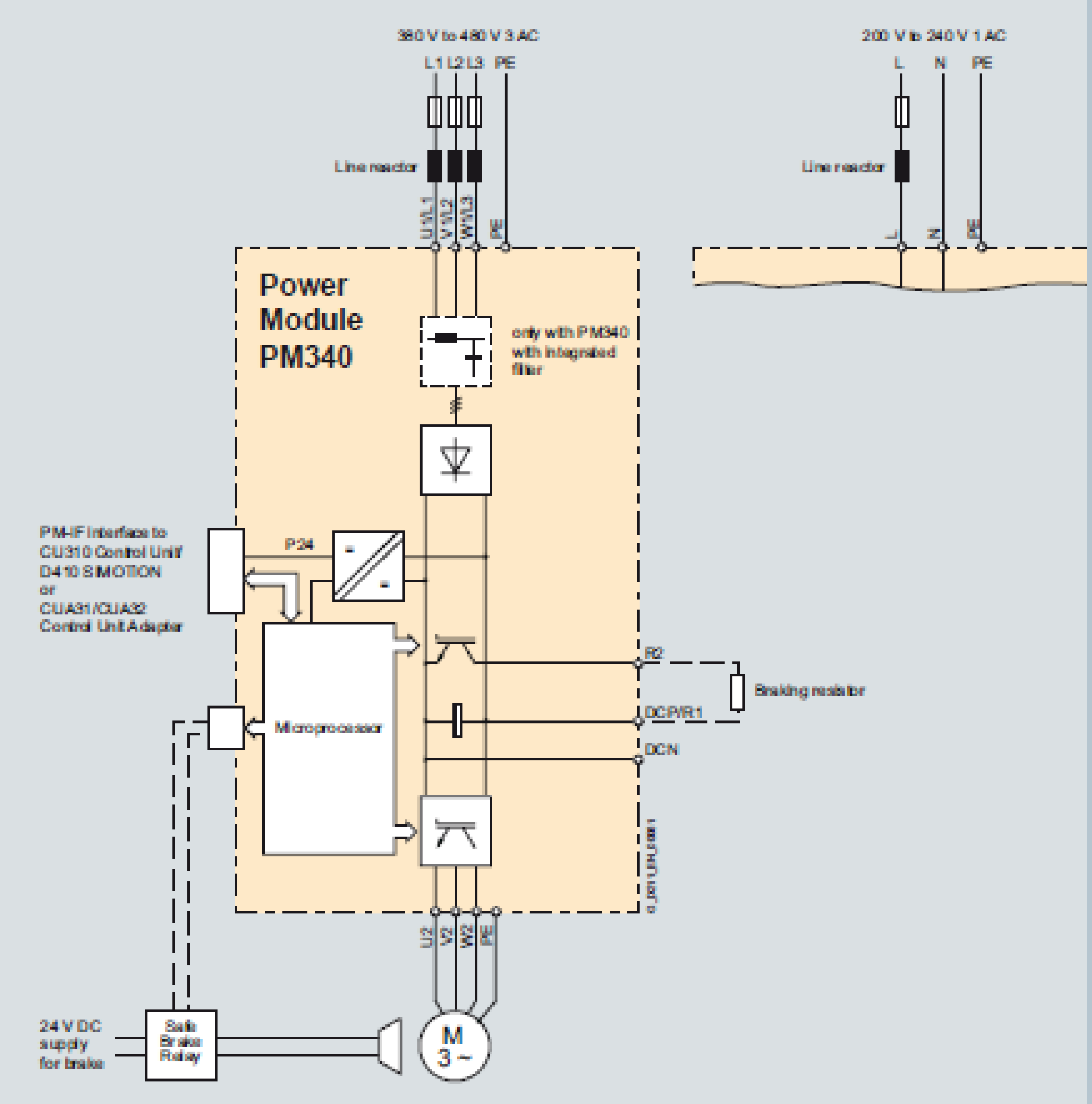
Coding switches for PROFIBUS

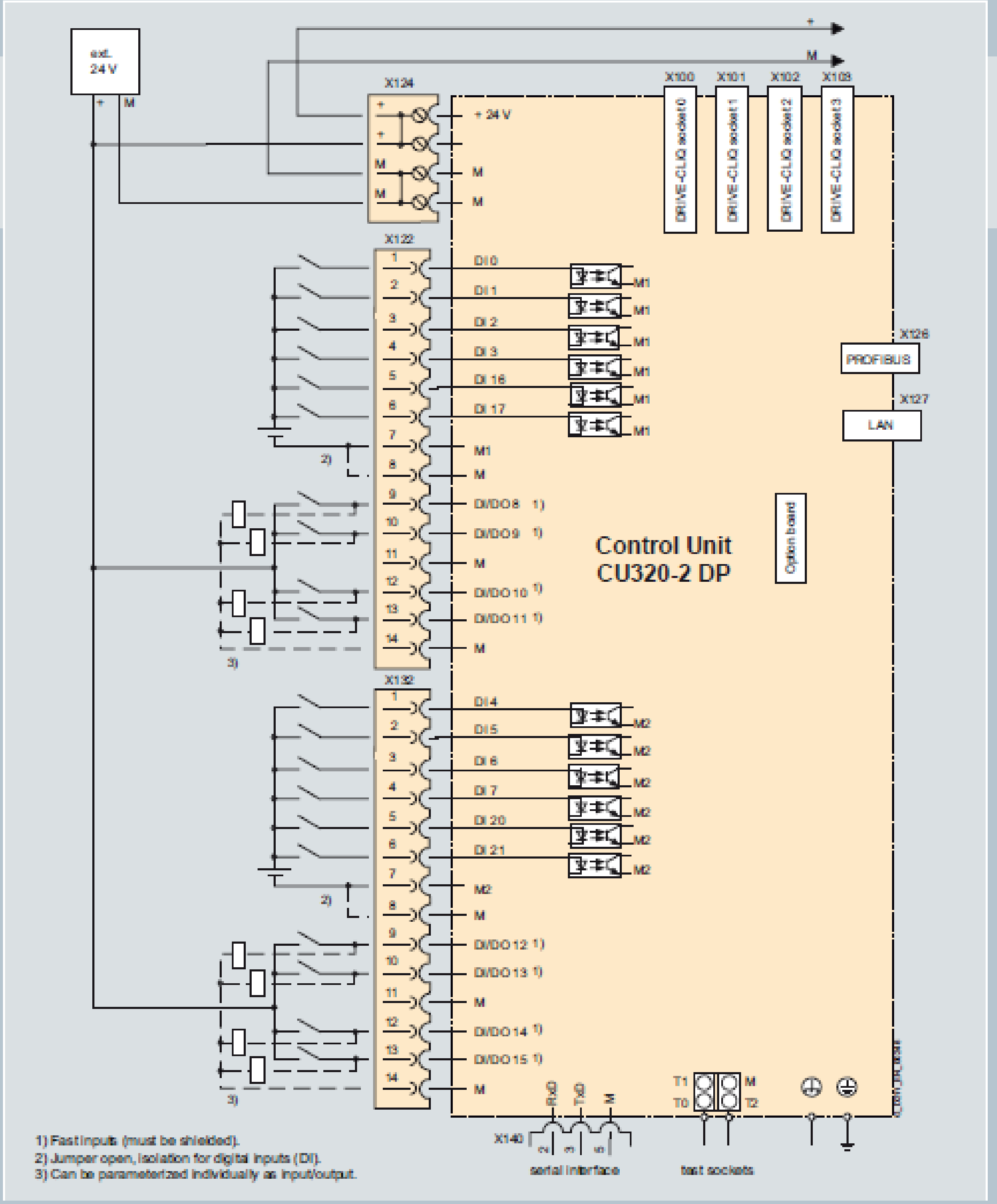
Control Unit



The modular software architecture enables the highest degree of flexibility

PM340 and Control Unit CU320-2DP



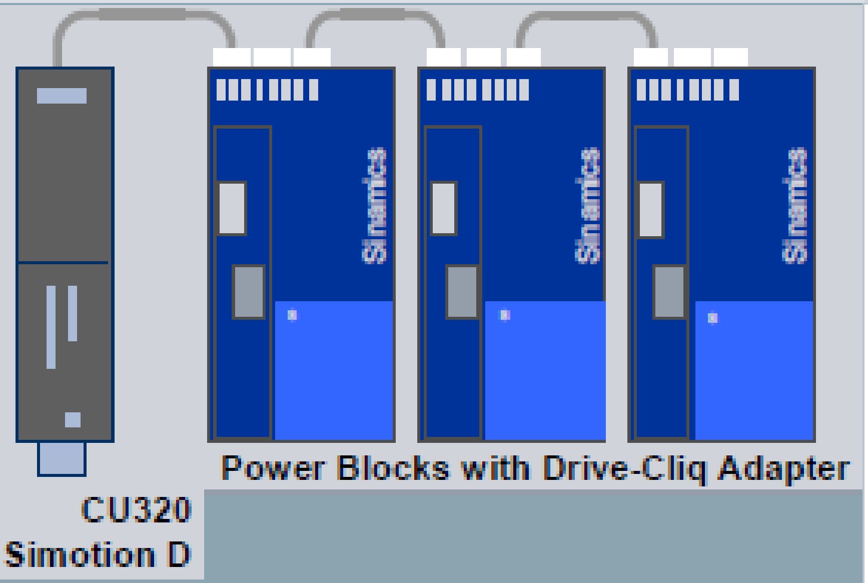


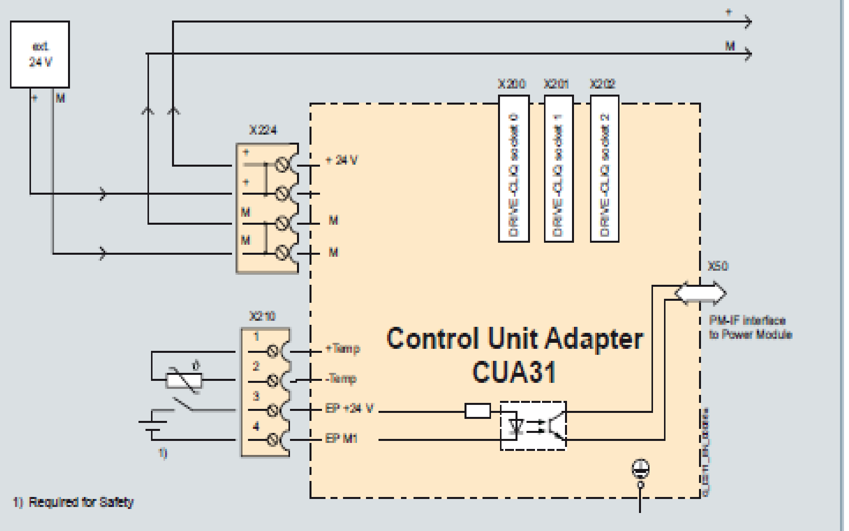
1) Fast inputs (must be shielded).
2) Jumper open, isolation for digital inputs (DI).
3) Can be parameterized individually as input/output.

Control Unit Adapter

The modular concept permits flexible topologies – even with AC/AC units

- Converts PM-IF Interface to Drive CLiQ interface.
- Used for operating PM340 (blocksize) with CU320 or Simotion D





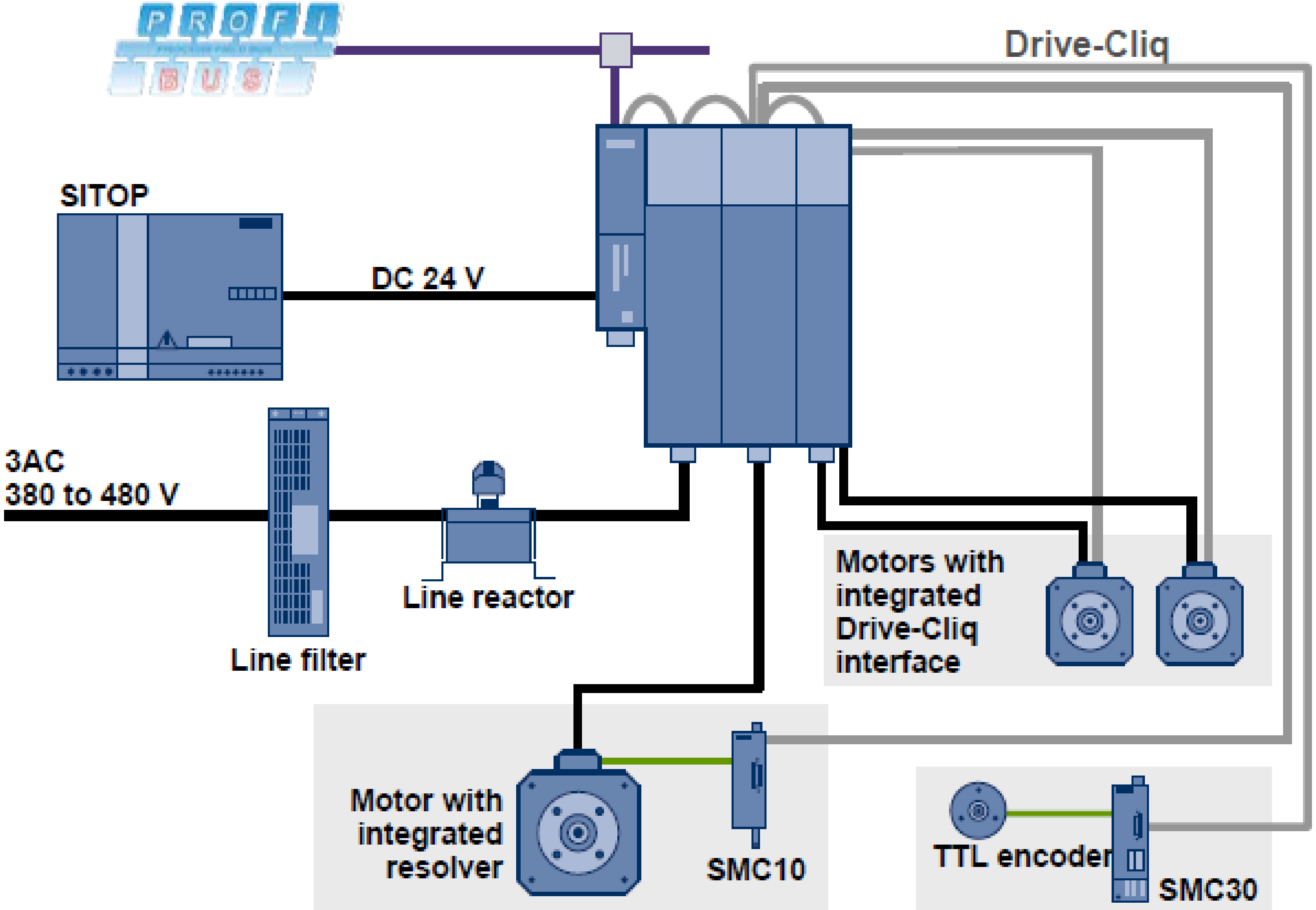
CUA31

- 1 temperature sensor input (KTY84-130 or PTC)
- 3 DRIVE-CLiQ sockets
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 safe standstill input (enable pulses)

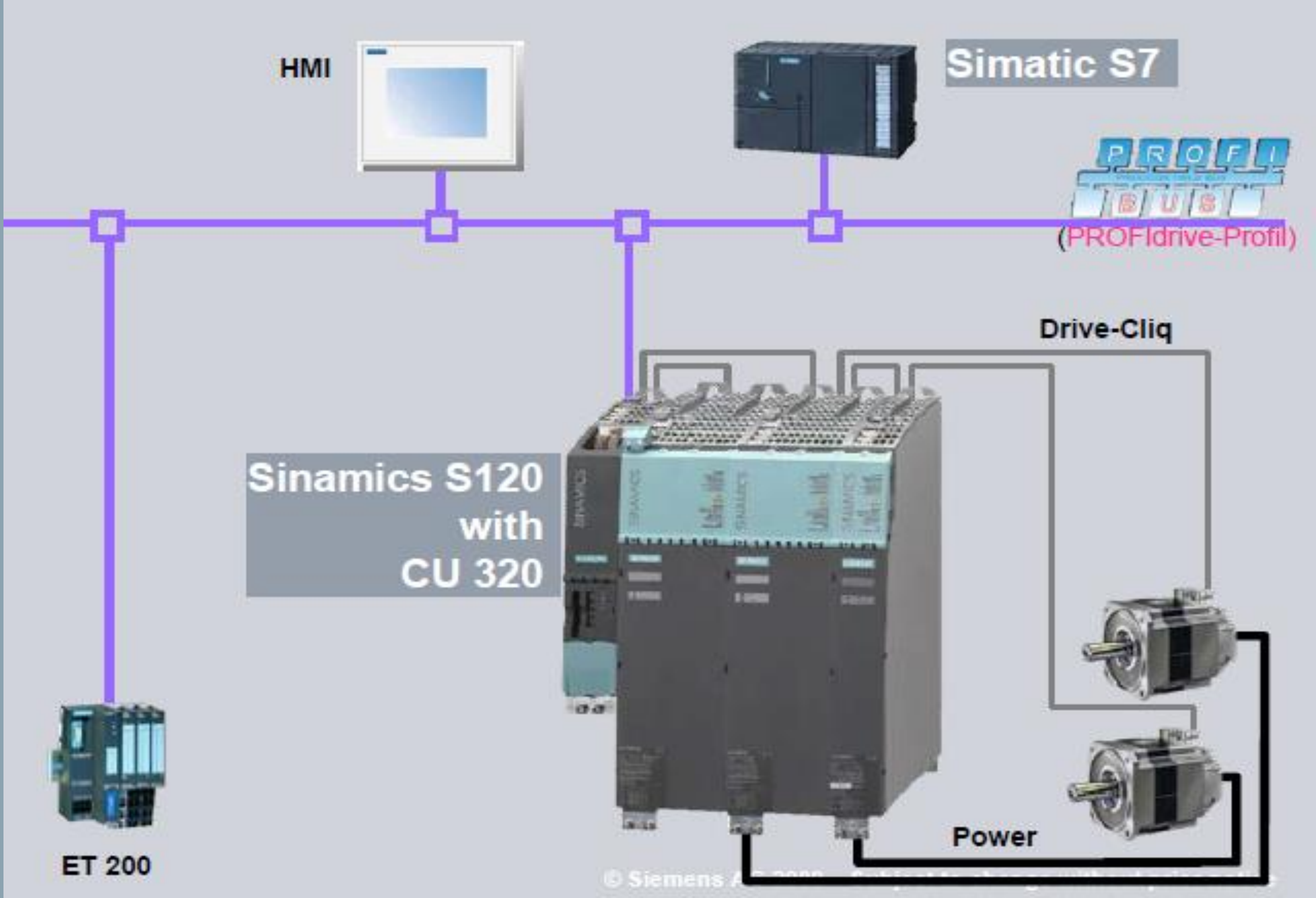
CUA32

- 1 temperature sensor input (KTY84-130 or PTC)
- 3 DRIVE-CLiQ sockets
- 1 connection for the electronic power supply via the 24 V DC power supply connector
- 1 safe standstill input (enable pulses)
- 1 HTL/TTL encoder evaluation

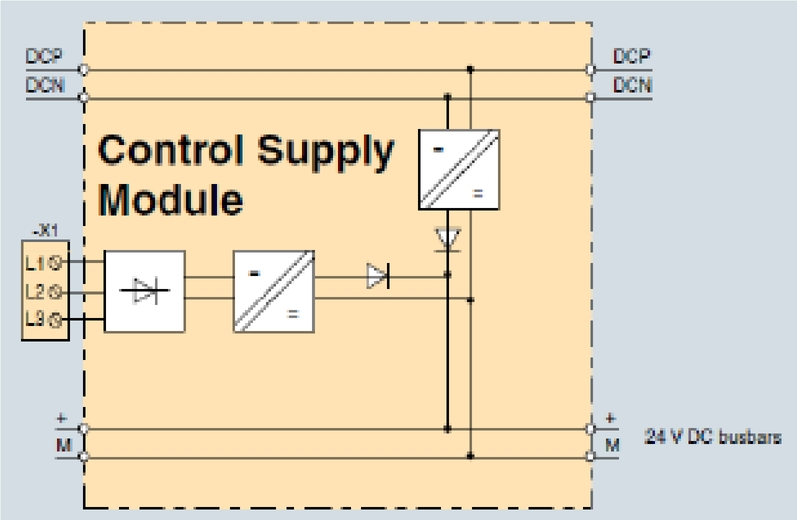
Sinamics S120 – 3 Axis Configuration Example

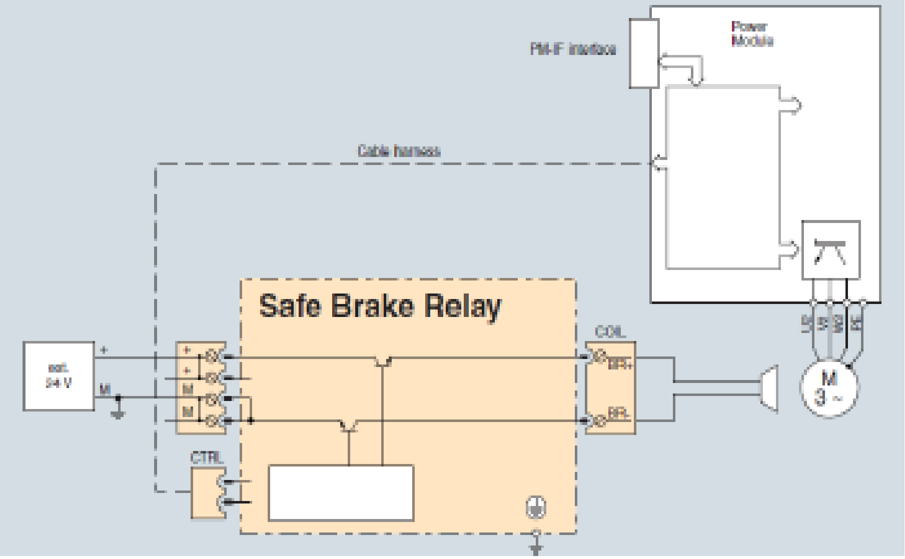


Motion Control configuration with Sinamics S120 and Simatic S7



Supplementary components



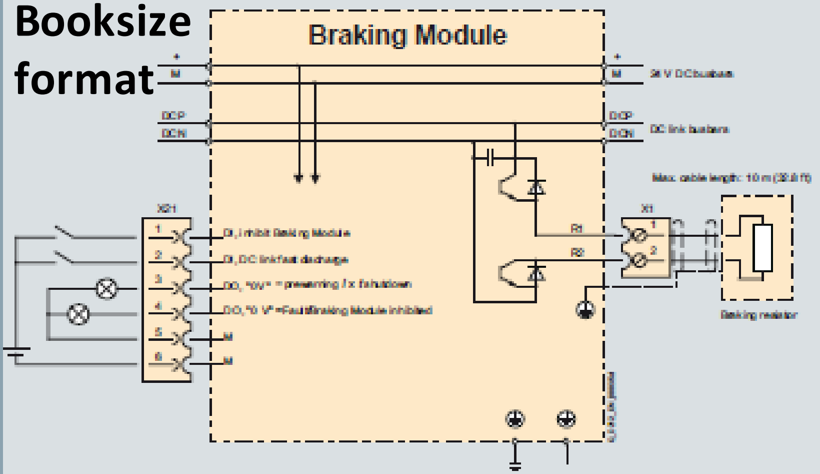


DC Link ‘Adapter’ Module & ‘Rectifier Adapter’ Module

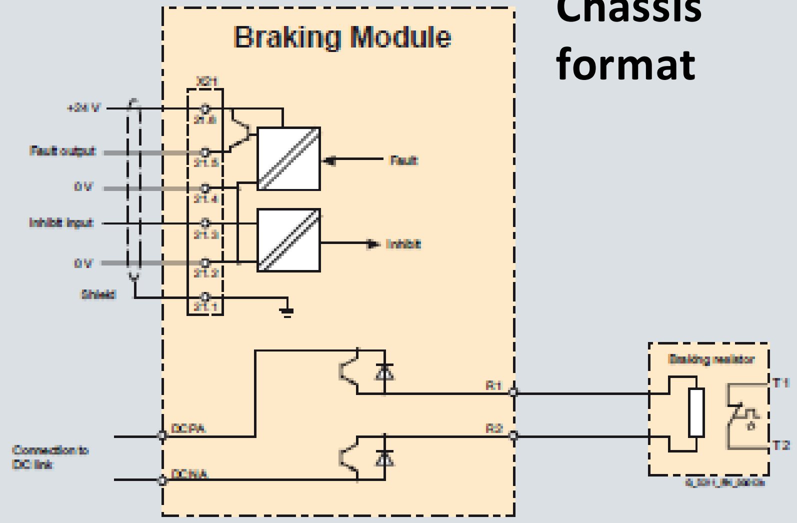
DC-Link Components Chassis Design

SIEMENS

Booksize format


Braking Module
+
M
DCP
DCN
24 V DC busbars
DC link busbars
Max. cable length: 10 m (32.8 ft)
X21
1
2
3
4
5
6
DI, Inhibit Braking Module
DI, DC link fast discharge
DO, "0 V" = prewarning I x t shutdown
DO, "0 V" = Fault/Braking Module inhibited
M
M
R1
R2
X1
Braking resistor

Chassis format



Braking Module and braking resistors

- Convert braking energy into heat in the external braking resistor
- Three Braking Modules and the matching braking resistors are available:

Size	FX	GX	HX	JX
Continuous power BM	25kW	50kW	50kW	50kW
Peak power BM	125kW	250kW	250kW	250kW
Slots	1	1	2	3

- The Braking Module is directly installed in a motor or line module and does not require any additional space in the cabinet.

Braking-Module (BM)

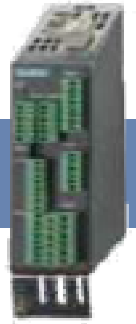
Braking resistor

Scalable concept allows a solution that is tailored to the particular application for 4Q operation

Supplementary components-Control

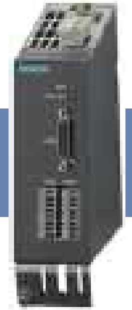
Terminal Communication Boards

- Provide additional digital and analog I/O
- CAN-Bus interface



Terminal Modules

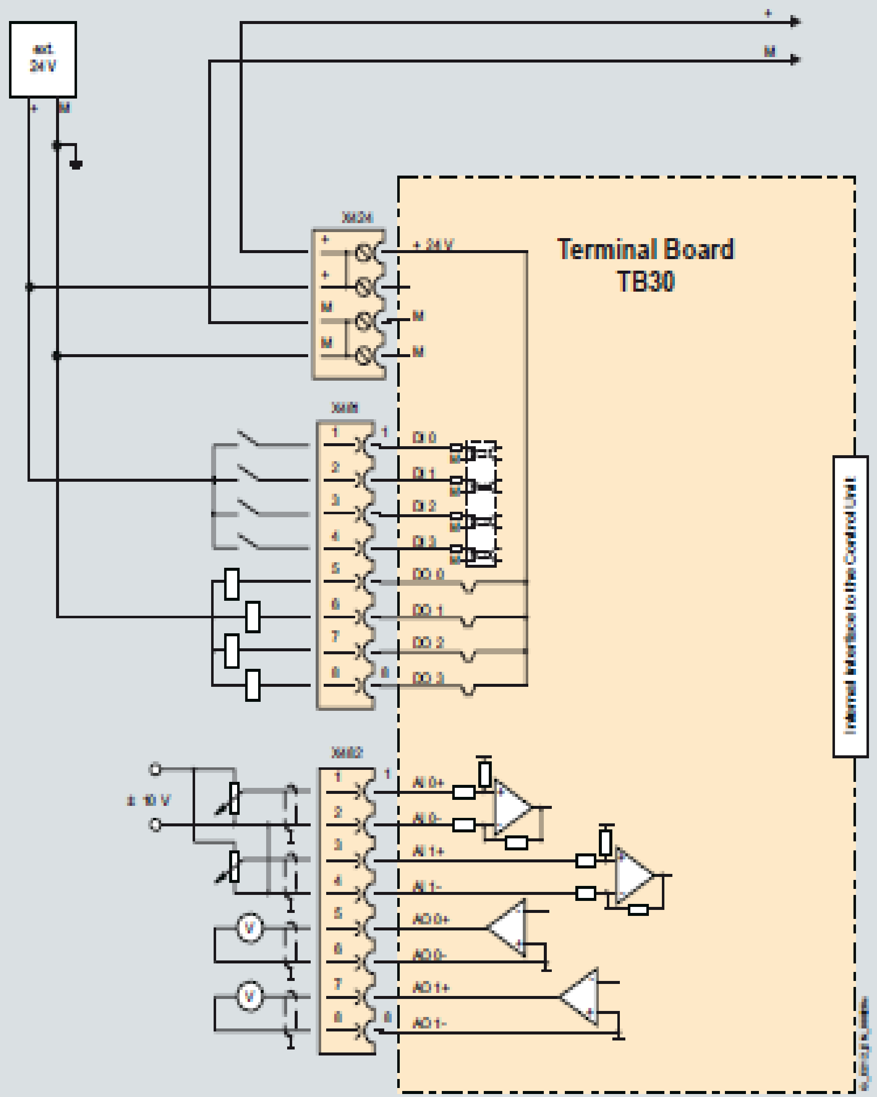
- Additional digital and analog I/O via DRIVE-CLiQ



Sensor Modules

- Encoder interface via DRIVE-CLiQ (to Power Module)

Terminal/Communication Boards

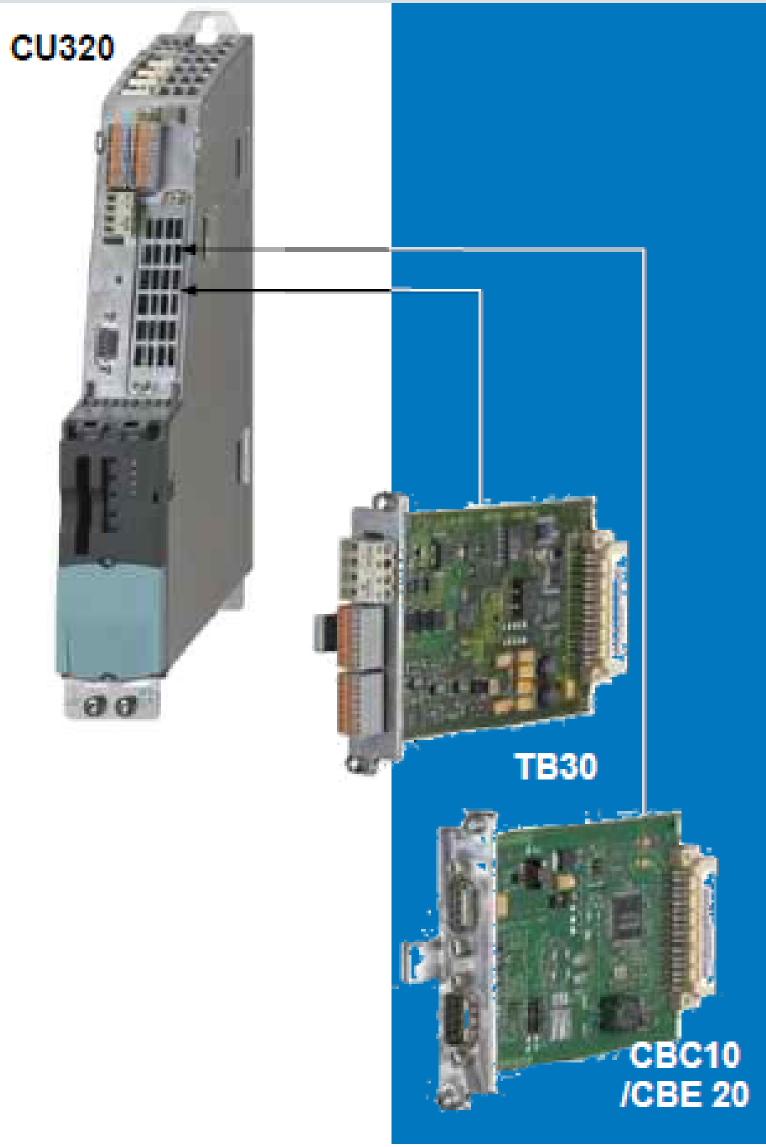


Terminal Board TB30

- Fast digital I/O:
  4 DI, 4 DO
- 2 AI, 2 AO, e.g. as analog setpoint interface

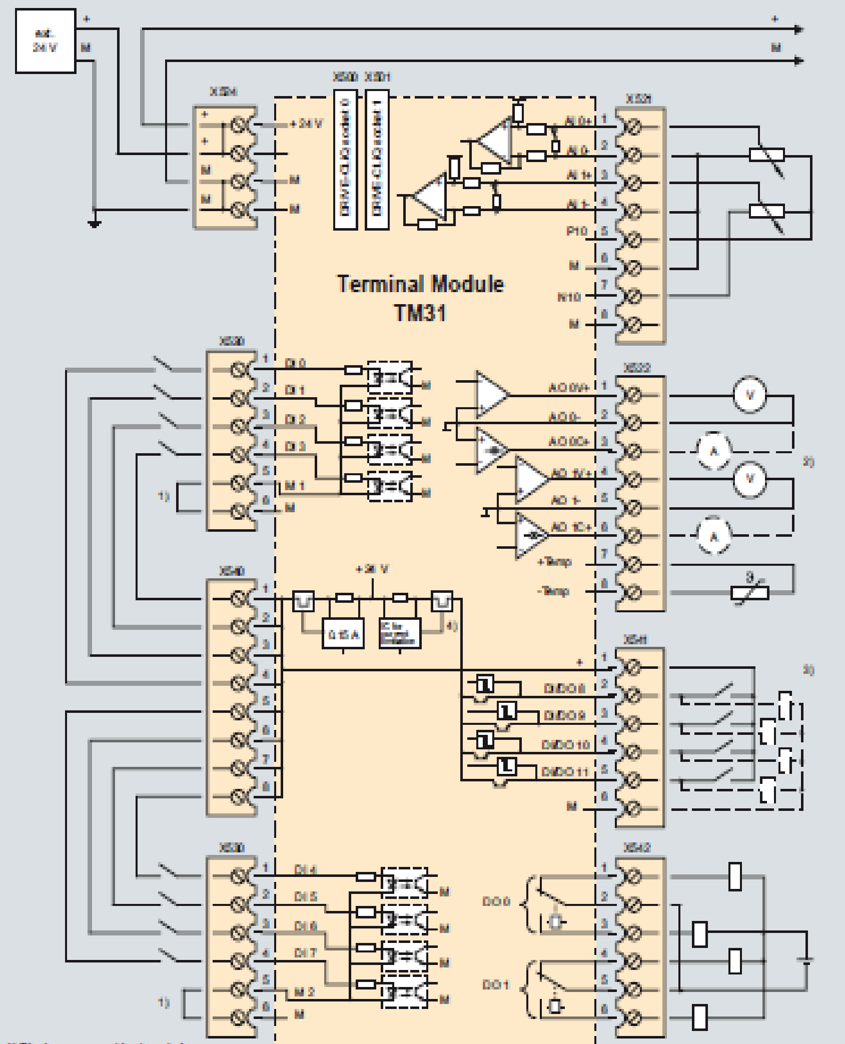
Communication Board

- CBC10:
  CAN-Bus Interface with CAN-Protokol according CANopen drives profile
- CBE20:
  PROFINET board



Terminal Modules

SIEMENS



1) The jumpers must be inserted in this circuit example.
2) Can be parameterized individually as current source.
3) Can be parameterized individually as output.
4) Current limitation can be parameterized (0.1 A or 1 A)

TM15, TM31, TM41, TM54F

Terminal Module for I/O Interface

- TM15- 24 DI/DO
- TM31- 8DI, 4 DI/DO, 2AI, 2AO, 2 Relay DO, 1 KTY84
- TM41- 4DI, 4DI/DO, 1AI, Simulation of Incremental Encoder
- TM54F- 4F-DO, 10 F-DI, Safety Integrated Functions

Terminal Modules

Sensor Modules for Encoder Interface

SIEMENS

For connecting 'Encoders without Drive CLiQ interface' (integrated Temperature Evaluation)

- **SMC10 (Sensor Module *Cabinet*)**
  - Resolver (2-pole, Multi-pole)
- **SMC20 (Sensor Module *Cabinet*)**
  - Sin/cos 1Vpp incremental encoders or
  - EnDat absolute value encoders
  - SSI Encoders
- **SMC30 (Sensor Module *Cabinet*)**
  - TTL encoders / HTL encoders
  - SSI encoders (with & without TTL/HTL incremental signals)

SMC10,20

SMC30

Sensor Modules for Encoder Interface

SIEMENS

For connecting 'Encoders without Drive CLiQ interface' (integrated Temperature Evaluation)

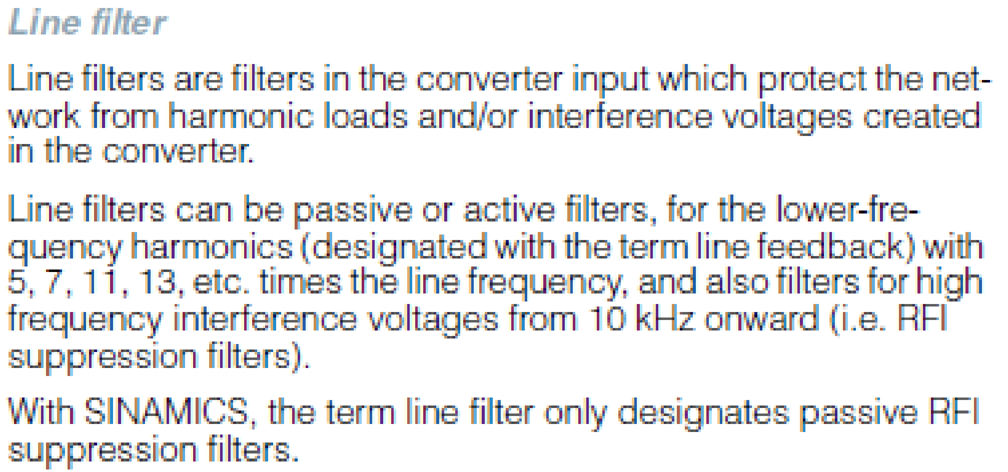
- **SME20 (Sensor Module *External*)-Rotary Systems**
  - External Encoder Evaluation (Incremental type Systems)
  - IP67
- **SME25 (Sensor Module *External*)-Rotary Systems**
  - External Encoder Evaluation (Absolute type Systems)
  - IP67
- **SME120 (Sensor Module *External*)-Linear Systems**
  - External Encoder Evaluation (Incremental type Systems)
  - IP67
- **SME125 (Sensor Module *External*)-Linear Systems**
  - External Encoder Evaluation (Absolute type Systems)
  - IP67

SME20

SME120

Line-side power components

SIEMENS

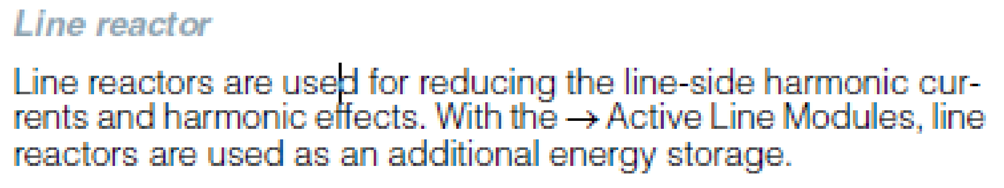


Line filter

Line filters are filters in the converter input which protect the network from harmonic loads and/or interference voltages created in the converter.

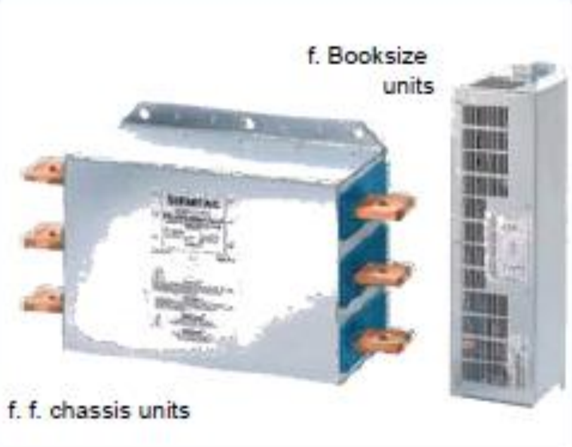
Line filters can be passive or active filters, for the lower-frequency harmonics (designated with the term line feedback) with 5, 7, 11, 13, etc. times the line frequency, and also filters for high frequency interference voltages from 10 kHz onward (i.e. RFI suppression filters).

With SINAMICS, the term line filter only designates passive RFI suppression filters.



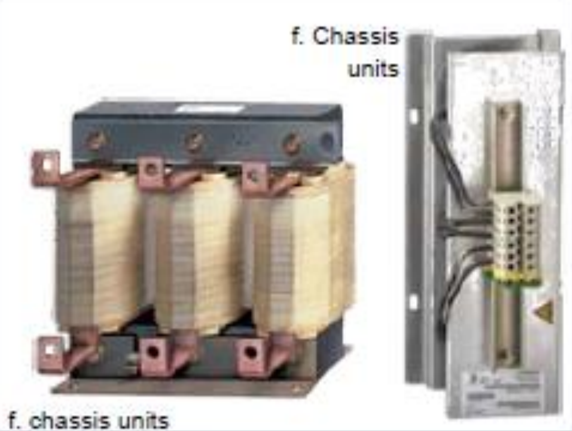
Line reactor

Line reactors are used for reducing the line-side harmonic currents and harmonic effects. With the → Active Line Modules, line reactors are used as an additional energy storage.



Line filters

- Limit high-frequency harmonics fed back into the line supply
- 5-120 kW
- 200 – 1100kW



Line reactors

Limit low-frequency harmonics fed back into the line supply

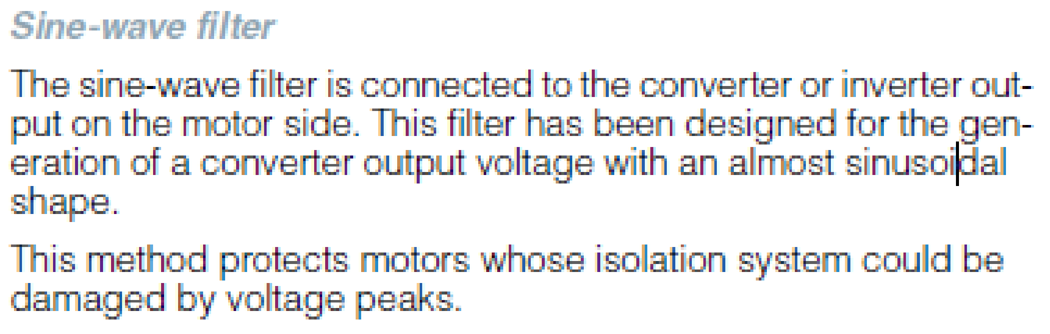
Relieve the power semiconductors of the line modules

5 – 120kW

250 – 1100kW

Line-side power components ensure reliable operation and minimize the harmonics

Motor-side power components

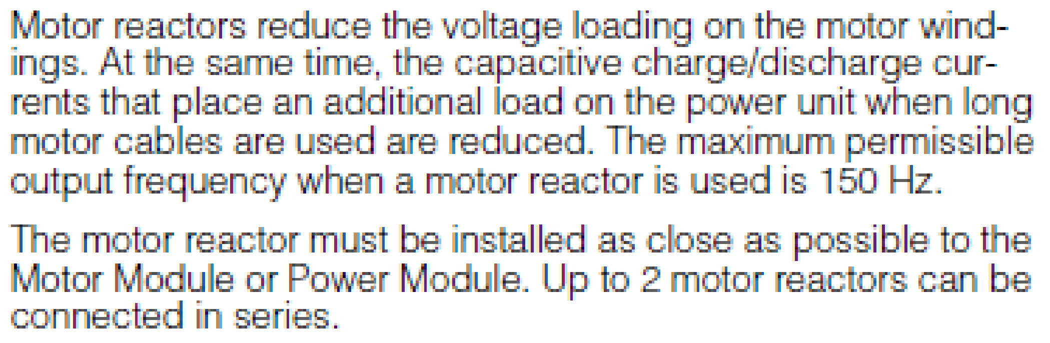


Sine-wave filter

The sine-wave filter is connected to the converter or inverter output on the motor side. This filter has been designed for the generation of a converter output voltage with an almost sinusoidal shape.

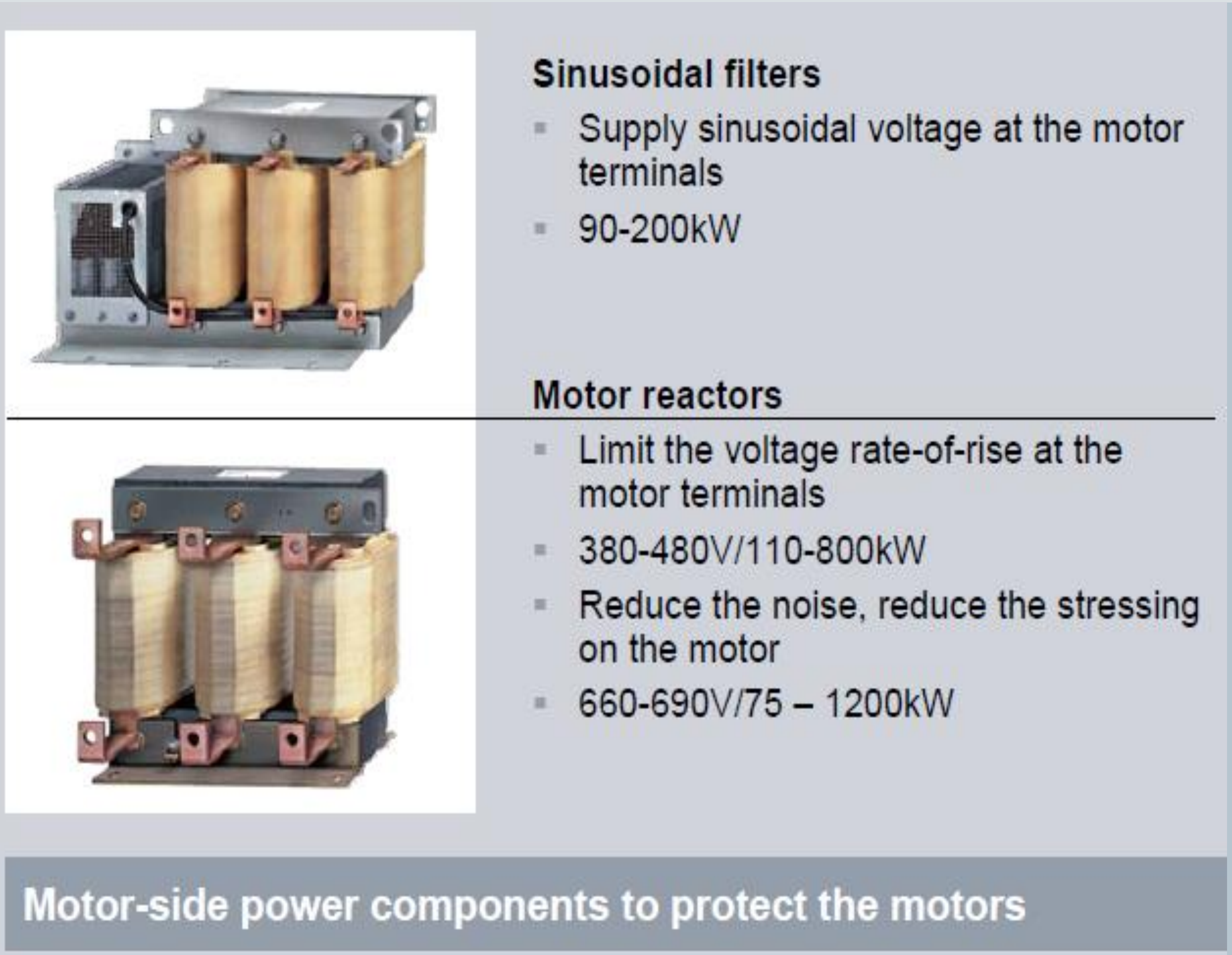
This method protects motors whose isolation system could be damaged by voltage peaks.

MOTOR REACTOR



Motor reactors reduce the voltage loading on the motor windings. At the same time, the capacitive charge/discharge currents that place an additional load on the power unit when long motor cables are used are reduced. The maximum permissible output frequency when a motor reactor is used is 150 Hz.

The motor reactor must be installed as close as possible to the Motor Module or Power Module. Up to 2 motor reactors can be connected in series.



Sinusoidal filters

- Supply sinusoidal voltage at the motor terminals
- 90-200kW

Motor reactors

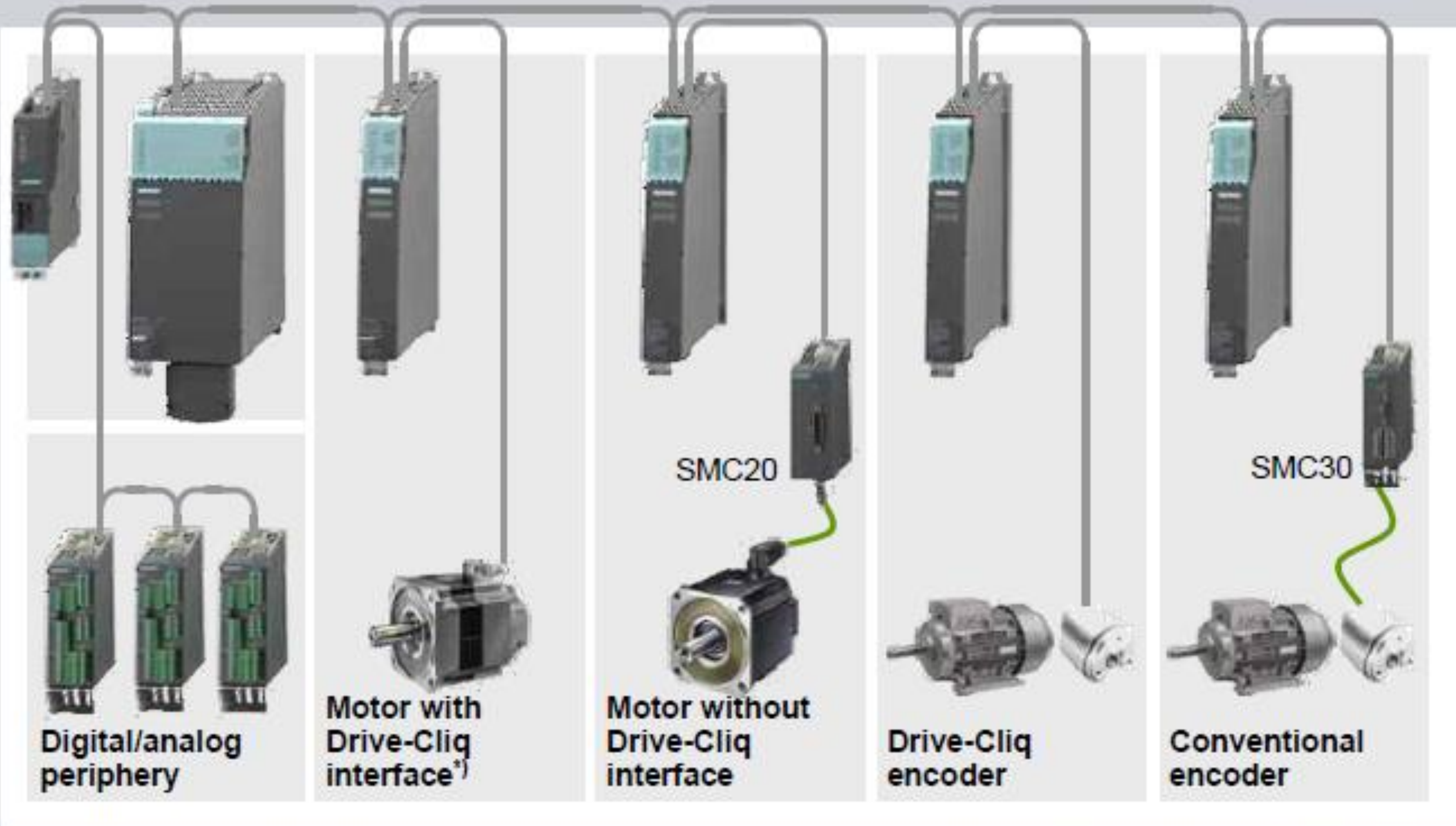
- Limit the voltage rate-of-rise at the motor terminals
- 380-480V/110-800kW
- Reduce the noise, reduce the stressing on the motor
- 660-690V/75 – 1200kW

Motor-side power components to protect the motors

Drive-Cliq and Nodes

- Real-time control data transfer
- Gathering diagnostic data and parameter values
- Fault tolerant transfer protocol
- Automatic node recognition
- Simple handling using
  - Standardized plugs and
  - Pre-assembled cables
- Integral 24 V power conductors

Drive-Cliq – the real-time serial system interface for Sinamics



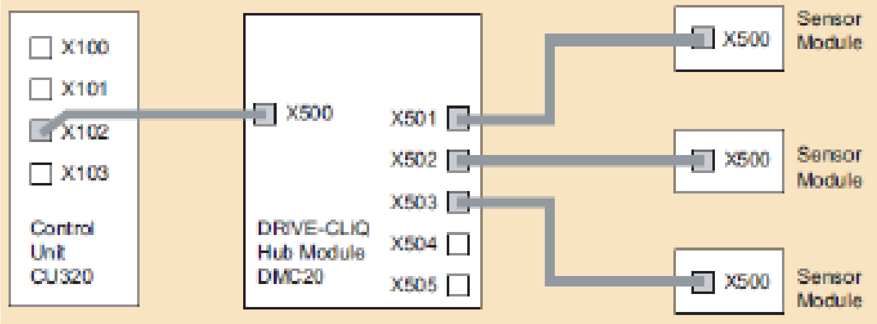
All drive-related components are connected to Sinamics S120 via Drive-Cliq

Drive CLiQ Hub (DMC20)

SIEMENS

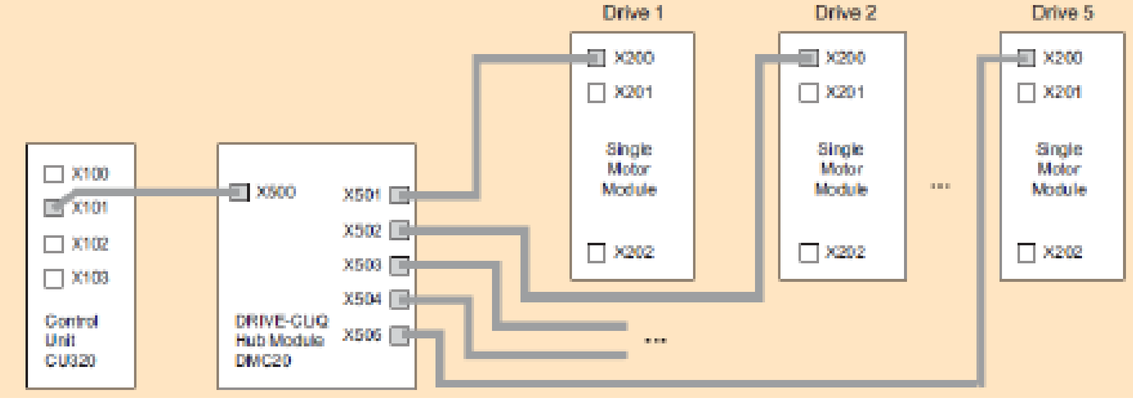
The DRIVE-CLiQ DMC20 Hub Module is used to implement star-shaped distribution of a DRIVE-CLiQ line. Two DRIVE-CLiQ DMC20 Hub Modules can be connected in series (cascaded).

- 6 DRIVE-CLiQ sockets for connecting 5 DRIVE-CLiQ participants
- 1 connection for the electronics power supply via the 24 V DC rectifier connector

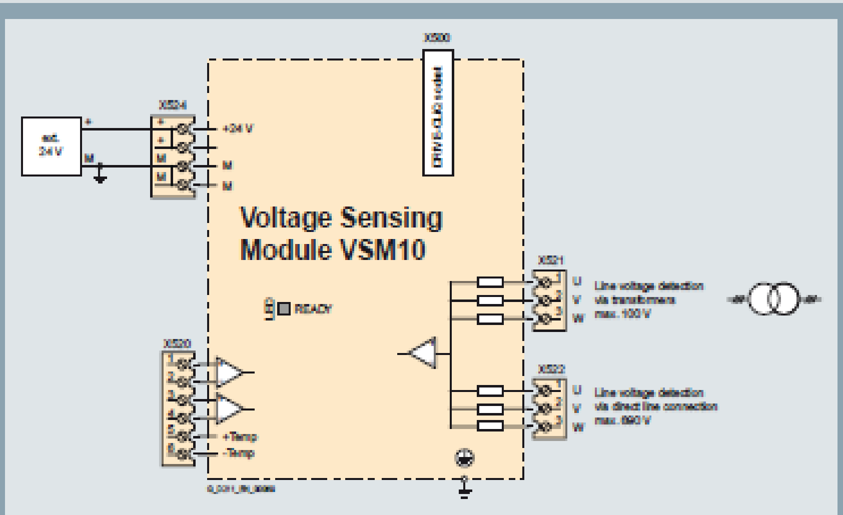


Signals from various Sensor Modules to 1 CU320

Removing individual Drive CLiQ participants without interrupting the data exchange with the remaining participants in Drive CLiQ network.



Voltage Sensing Module (VSM10)



The VSM10 Voltage Sensing Module has the following interfaces:

- 1 connection for direct line voltage detection up to 690 V
- 1 connection for line voltage detection using voltage transformers, maximum voltage 100 V
- 2 analog inputs (reserved for resonance monitoring in Active Interface Modules in chassis format)
- 1 temperature sensor input (KTY84-130 or PTC)
- 1 DRIVE-CLiQ socket
- 1 connection for the electronics power supply via the 24 V DC power supply connector
- 1 PE (protective earth) connection

The VSM10 Voltage Sensing Module can detect the exact line voltage characteristic and supports fault-free operation of Line Modules when power supply conditions are unfavorable, e.g. with severe voltage fluctuations or short-time interruptions.

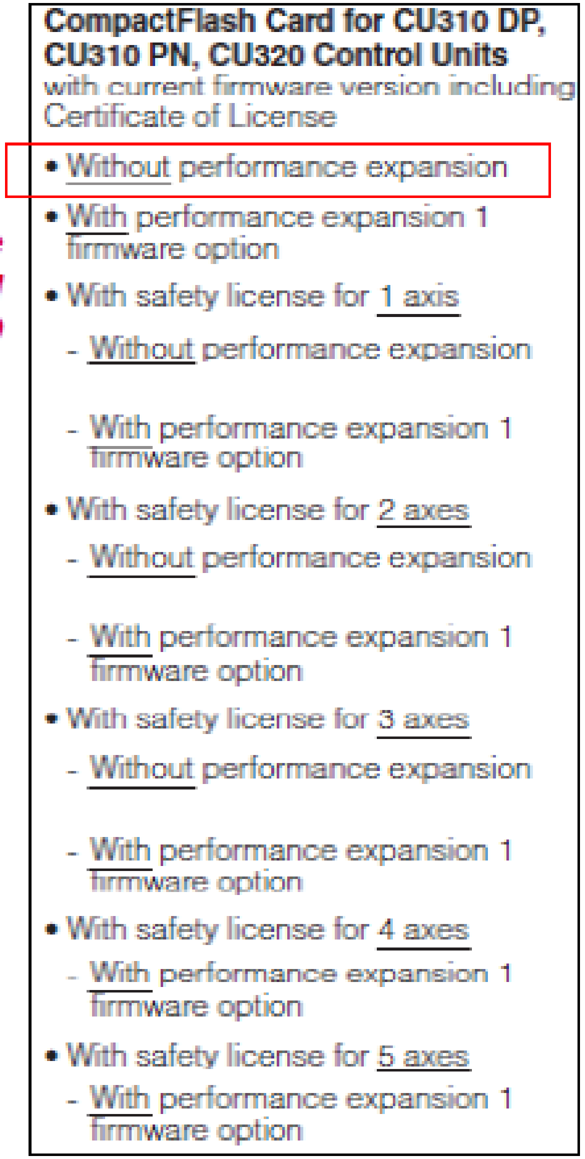
The VSM10 Voltage Sensing Module is integrated in chassis format Active Interface Modules. It can be used optionally with all booksize format Active Line Modules and 16 kW or 36 kW Smart Line Modules.

Compact Falsh Card

SIEMENS

Contains Firmware Details, Parameter Settings & Licensing Details (Performance Expansion & Additional Safety License)

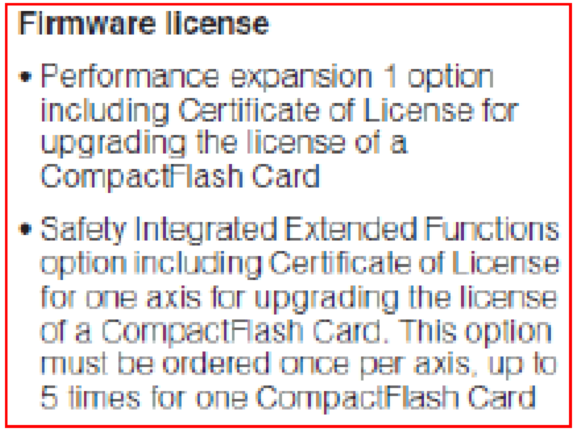
No Performance Expansion required for CU310



CompactFlash Card for CU310 DP, CU310 PN, CU320 Control Units
with current firmware version including Certificate of License

- Without performance expansion
- With performance expansion 1 firmware option
- With safety license for 1 axis
  - Without performance expansion
  - With performance expansion 1 firmware option
- With safety license for 2 axes
  - Without performance expansion
  - With performance expansion 1 firmware option
- With safety license for 3 axes
  - Without performance expansion
  - With performance expansion 1 firmware option
- With safety license for 4 axes
  - With performance expansion 1 firmware option
- With safety license for 5 axes
  - With performance expansion 1 firmware option

Can be ordered afterwards, if not ordered earlier



Firmware license

- Performance expansion 1 option including Certificate of License for upgrading the license of a CompactFlash Card
- Safety Integrated Extended Functions option including Certificate of License for one axis for upgrading the license of a CompactFlash Card. This option must be ordered once per axis, up to 5 times for one CompactFlash Card

Operator Panels-AOP30 & BOP

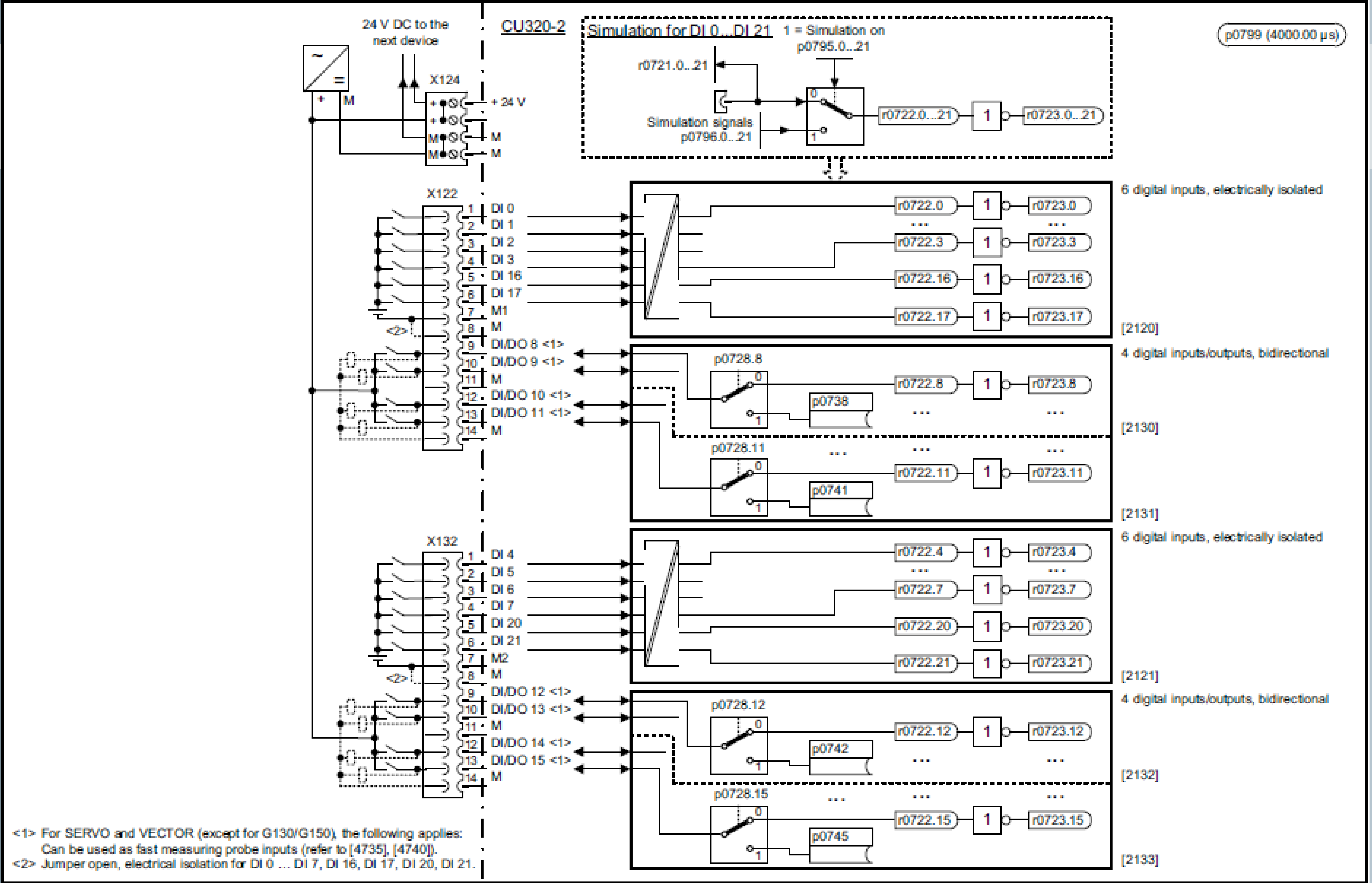
Advanced Operator Panel

- User-friendly menu for simple, prompted drive commissioning
- Plain-text display and bar-type graphics to visualize process quantities in a user-friendly fashion
- LEDs to display operating states
- Extensive help functions with a description of causes and remedies regarding faults and alarms.
- Drive operation possible from AOP30.
- Multi-language Interface

Basic Operator Panel

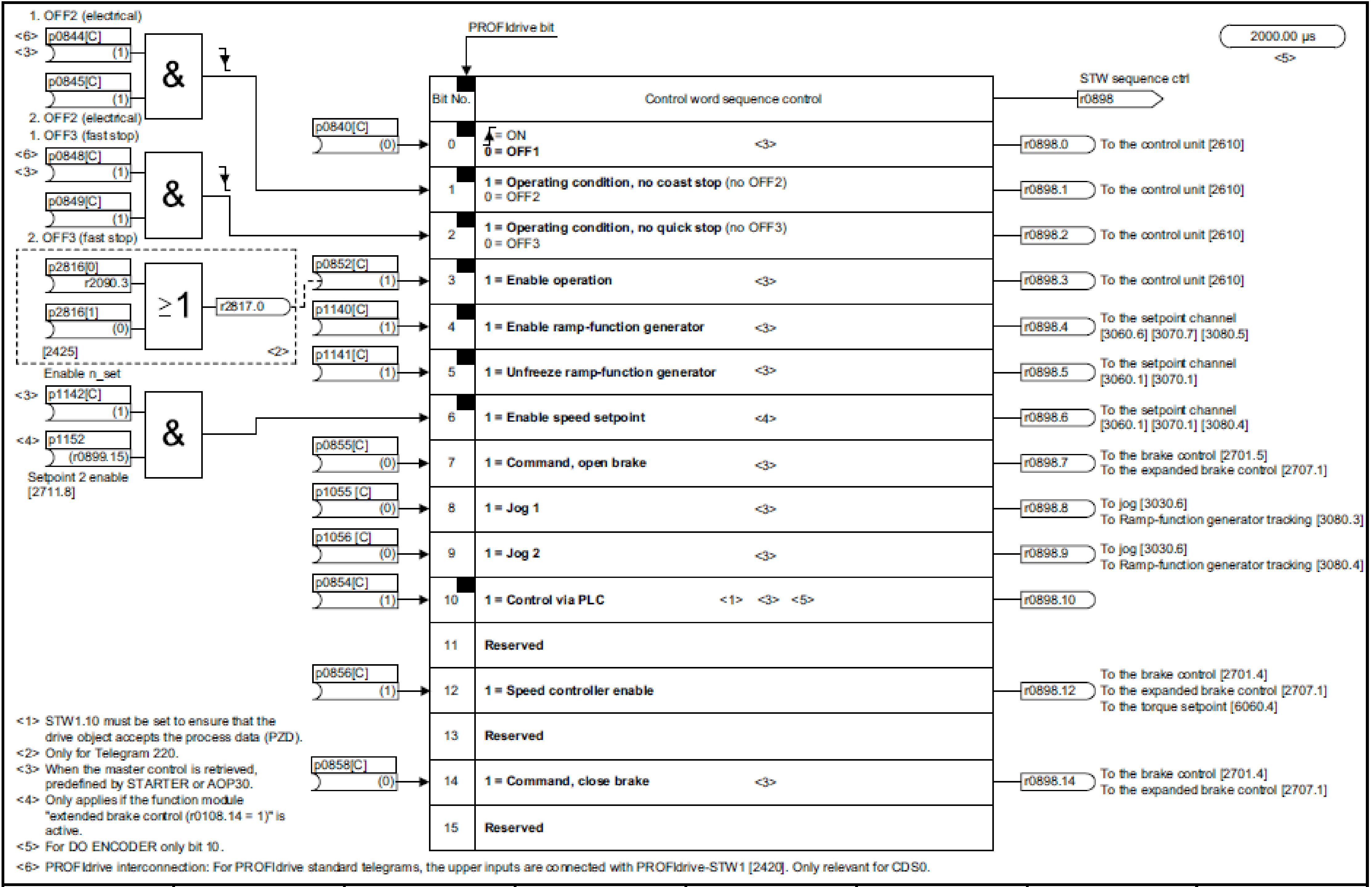
- Parameter setting and visualization
- Reading out alarm and fault codes
- Can be mounted on every CU320

Function Diagram



<1> For SERVO and VECTOR (except for G130/G150), the following applies:
Can be used as fast measuring probe inputs (refer to [4735], [4740]).
<2> Jumper open, electrical isolation for DI 0 ... DI 7, DI 16, DI 17, DI 20, DI 21.

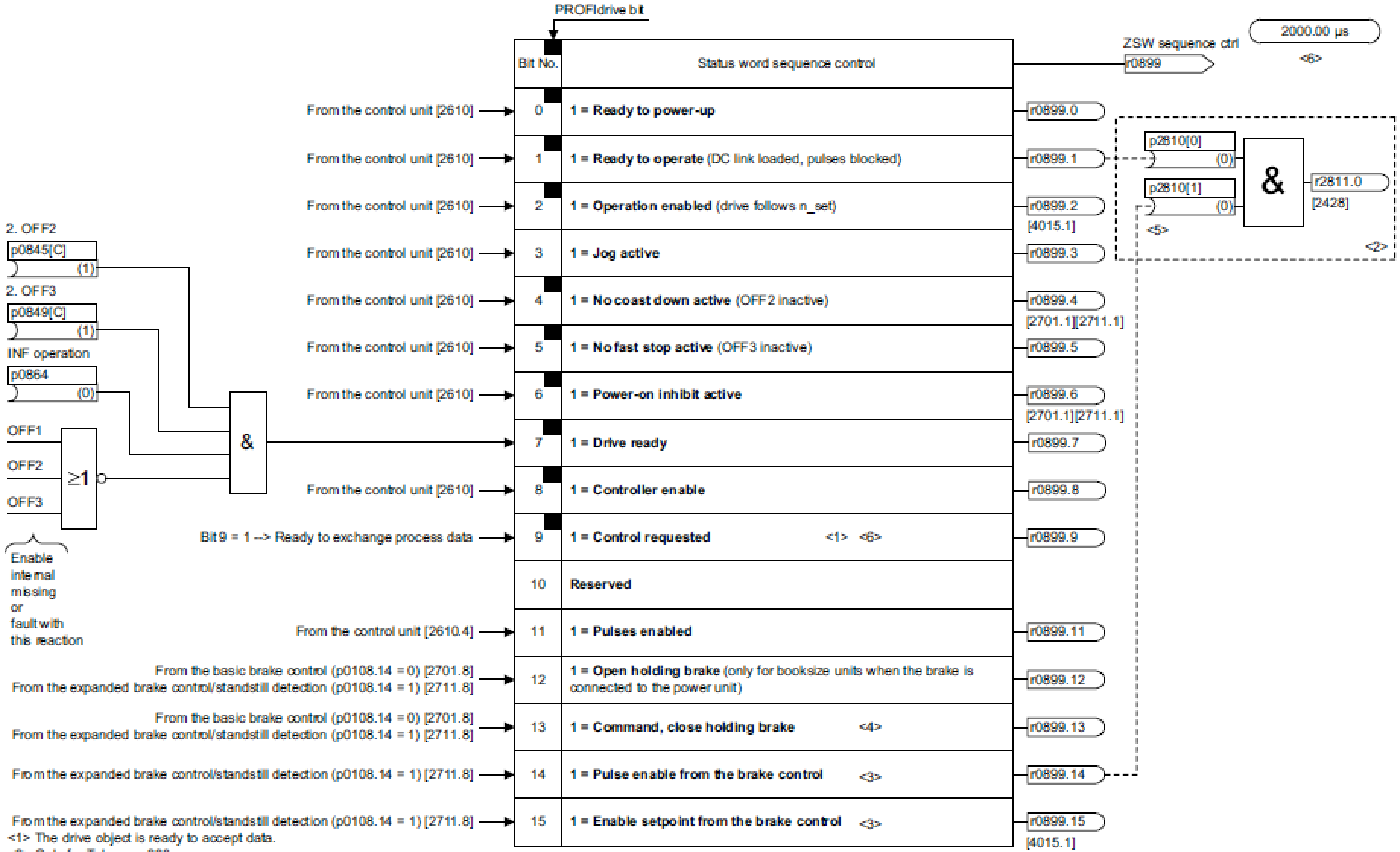
Control Word


1. OFF2 (electrical)
<6> p0844[C]
<3> (1)
p0845[C]
(1)
&
2. OFF2 (electrical)
1. OFF3 (fast stop)
<6> p0848[C]
<3> (1)
p0849[C]
(1)
&
2. OFF3 (fast stop)
p2816[0]
r2090.3
p2816[1]
(0)
≥1
r2817.0
[2425]
<2>
Enable n_set
<3> p1142[C]
(1)
<4> p1152
(r0899.15)
&
Setpoint 2 enable
[2711.8]
p0840[C] (0)
p0852[C] (1)
p1140[C] (1)
p1141[C] (1)
p0855[C] (0)
p1055 [C] (0)
p1056 [C] (0)
p0854[C] (1)
p0856[C] (1)
p0858[C] (0)
PROFIdrive bit
2000.00 µs
<5>
STW sequence ctrl
r0898
r0898.0 To the control unit [2610]
r0898.1 To the control unit [2610]
r0898.2 To the control unit [2610]
r0898.3 To the control unit [2610]
r0898.4 To the setpoint channel [3060.6] [3070.7] [3080.5]
r0898.5 To the setpoint channel [3060.1] [3070.1]
r0898.6 To the setpoint channel [3060.1] [3070.1] [3080.4]
r0898.7 To the brake control [2701.5] To the expanded brake control [2707.1]
r0898.8 To jog [3030.6] To Ramp-function generator tracking [3080.3]
r0898.9 To jog [3030.6] To Ramp-function generator tracking [3080.4]
r0898.10
r0898.12 To the brake control [2701.4] To the expanded brake control [2707.1] To the torque setpoint [6060.4]
r0898.14 To the brake control [2701.4] To the expanded brake control [2707.1]

Bit No.	Control word sequence control	
0	↑ = ON **0 = OFF1**	<3>
1	**1 = Operating condition, no coast stop** (no OFF2) 0 = OFF2	
2	**1 = Operating condition, no quick stop** (no OFF3) 0 = OFF3	
3	**1 = Enable operation**	<3>
4	**1 = Enable ramp-function generator**	<3>
5	**1 = Unfreeze ramp-function generator**	<3>
6	**1 = Enable speed setpoint**	<4>
7	**1 = Command, open brake**	<3>
8	**1 = Jog 1**	<3>
9	**1 = Jog 2**	<3>
10	**1 = Control via PLC**	<1> <3> <5>
11	**Reserved**	
12	**1 = Speed controller enable**	
13	**Reserved**	
14	**1 = Command, close brake**	<3>
15	**Reserved**	

<1> STW1.10 must be set to ensure that the drive object accepts the process data (PZD).
<2> Only for Telegram 220.
<3> When the master control is retrieved, predefined by STARTER or AOP30.
<4> Only applies if the function module "extended brake control (r0108.14 = 1)" is active.
<5> For DO ENCODER only bit 10.
<6> PROFIdrive interconnection: For PROFIdrive standard telegrams, the upper inputs are connected with PROFIdrive-STW1 [2420]. Only relevant for CDS0.

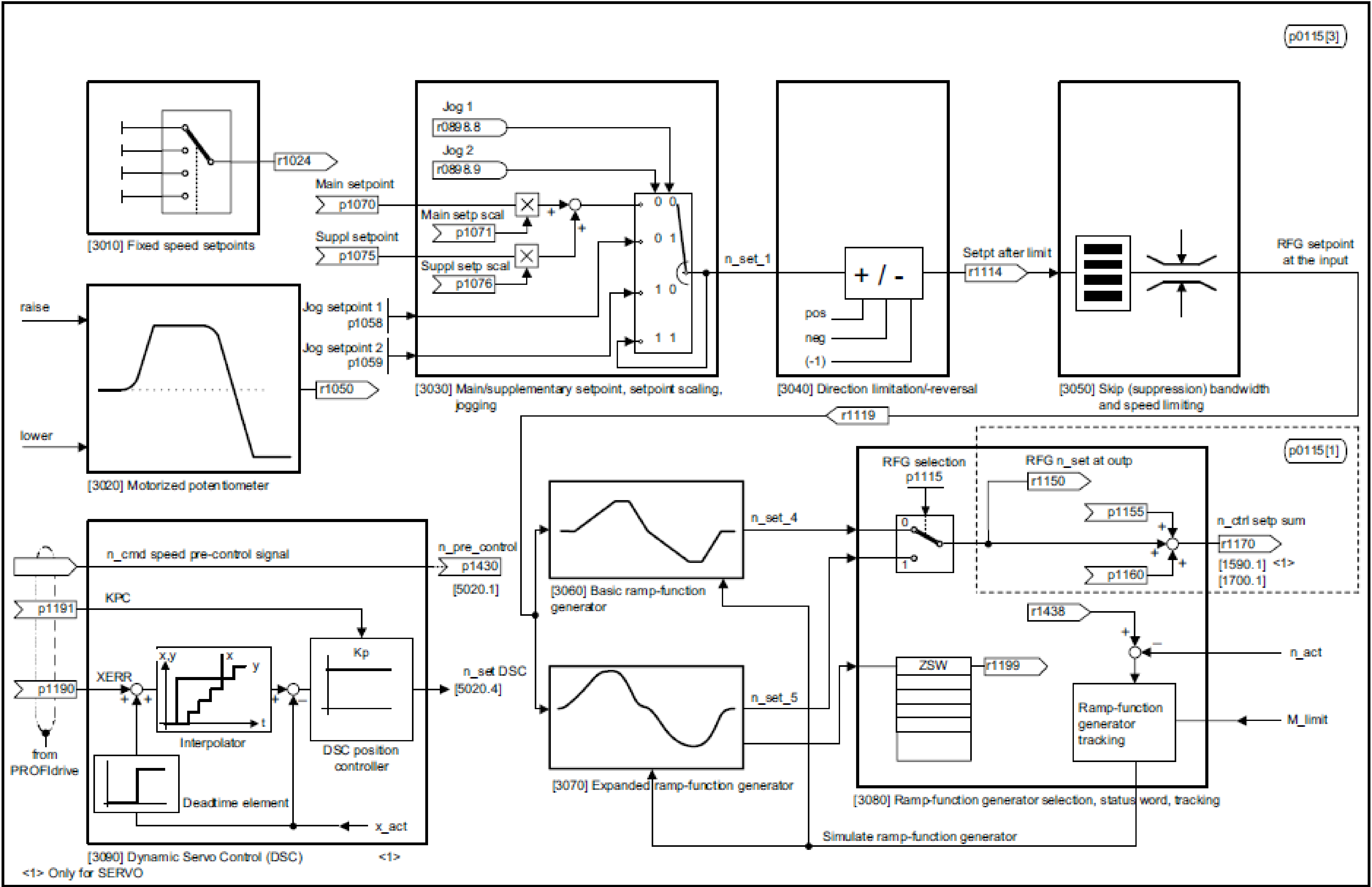
Status Word



Source	Bit No.	Status word sequence control	Output
From the control unit [2610]	0	**1 = Ready to power-up**	r0899.0
From the control unit [2610]	1	**1 = Ready to operate** (DC link loaded, pulses blocked)	r0899.1
From the control unit [2610]	2	**1 = Operation enabled** (drive follows n_set)	r0899.2 [4015.1]
From the control unit [2610]	3	**1 = Jog active**	r0899.3
From the control unit [2610]	4	**1 = No coast down active** (OFF2 inactive)	r0899.4 [2701.1][2711.1]
From the control unit [2610]	5	**1 = No fast stop active** (OFF3 inactive)	r0899.5
From the control unit [2610]	6	**1 = Power-on inhibit active**	r0899.6 [2701.1][2711.1]
	7	**1 = Drive ready**	r0899.7
From the control unit [2610]	8	**1 = Controller enable**	r0899.8
Bit 9 = 1 --> Ready to exchange process data	9	**1 = Control requested** <1> <6>	r0899.9
	10	**Reserved**	
From the control unit [2610.4]	11	**1 = Pulses enabled**	r0899.11
From the basic brake control (p0108.14 = 0) [2701.8] From the expanded brake control/standstill detection (p0108.14 = 1) [2711.8]	12	**1 = Open holding brake** (only for booksize units when the brake is connected to the power unit)	r0899.12
From the basic brake control (p0108.14 = 0) [2701.8] From the expanded brake control/standstill detection (p0108.14 = 1) [2711.8]	13	**1 = Command, close holding brake** <4>	r0899.13
From the expanded brake control/standstill detection (p0108.14 = 1) [2711.8]	14	**1 = Pulse enable from the brake control** <3>	r0899.14
From the expanded brake control/standstill detection (p0108.14 = 1) [2711.8]	15	**1 = Enable setpoint from the brake control** <3>	r0899.15 [4015.1]

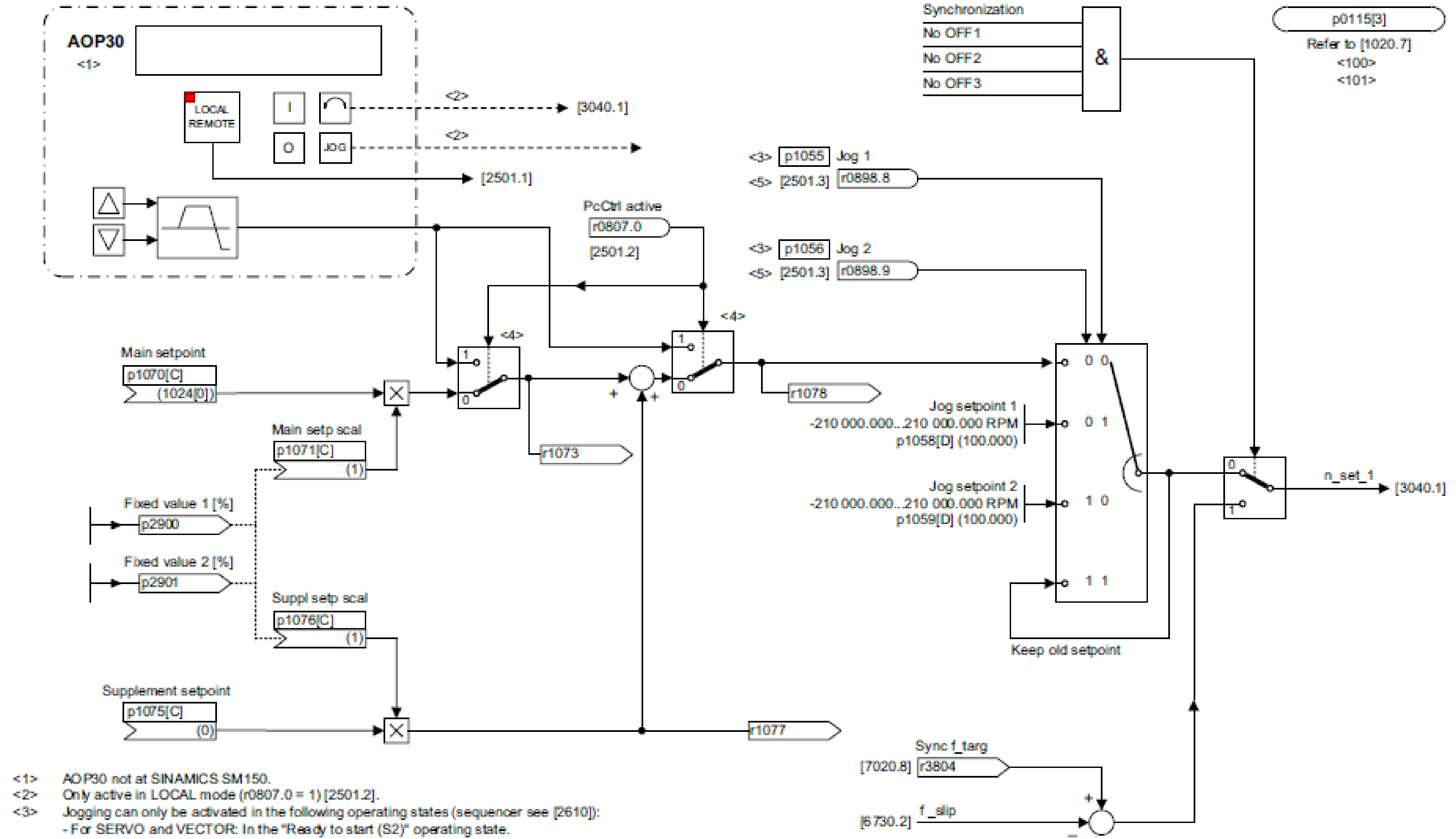
<1> The drive object is ready to accept data.
<2> Only for Telegram 220.
<3> These signals are only relevant if the "extended brake control" function module is active (r0108.14 = 1).
<4> If „Safe Brake Control" (SBC) is activated and selected, the brake is no longer controlled via this signal (Only with SINAMICS S120 Booksize).
<5> Only with message frame 220 and activated function module "Extended brake control" (r0108.14 = 1), otherwise hard wiring set to 1.
<6> For DO ENCODER only bit 9.

Setpoint



<1> Only for SERVO

Setpoint channel



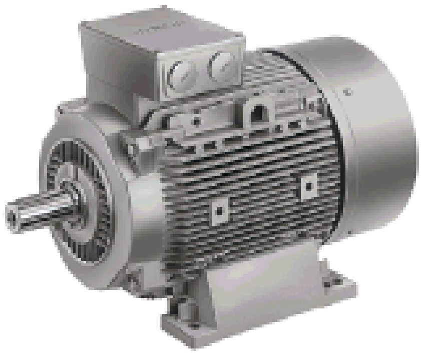
<1> AOP30 not at SINAMICS SM150.
<2> Only active in LOCAL mode (r0807.0 = 1) [2501.2].
<3> Jogging can only be activated in the following operating states (sequencer see [2610]):
- For SERVO and VECTOR: In the "Ready to start (S2)" operating state.
- For VECTORGL and VECTORMV: In the "Operation (S4)" operating strate.
<4> Only if control priority is with control panel with speed setpoint input.
<5> With simultaneous jog 1 and 2 (p1055 = p1056 = 1) the last setpoint remains effective (Freeze ramp-function generator).
<100> For SERVO, the following applies: Only if the function module "extended setpoint channel" is activated (r0108.8 = 1).
<101> To view the pre-assignment of the sampling times in p0115, refer to p0112.

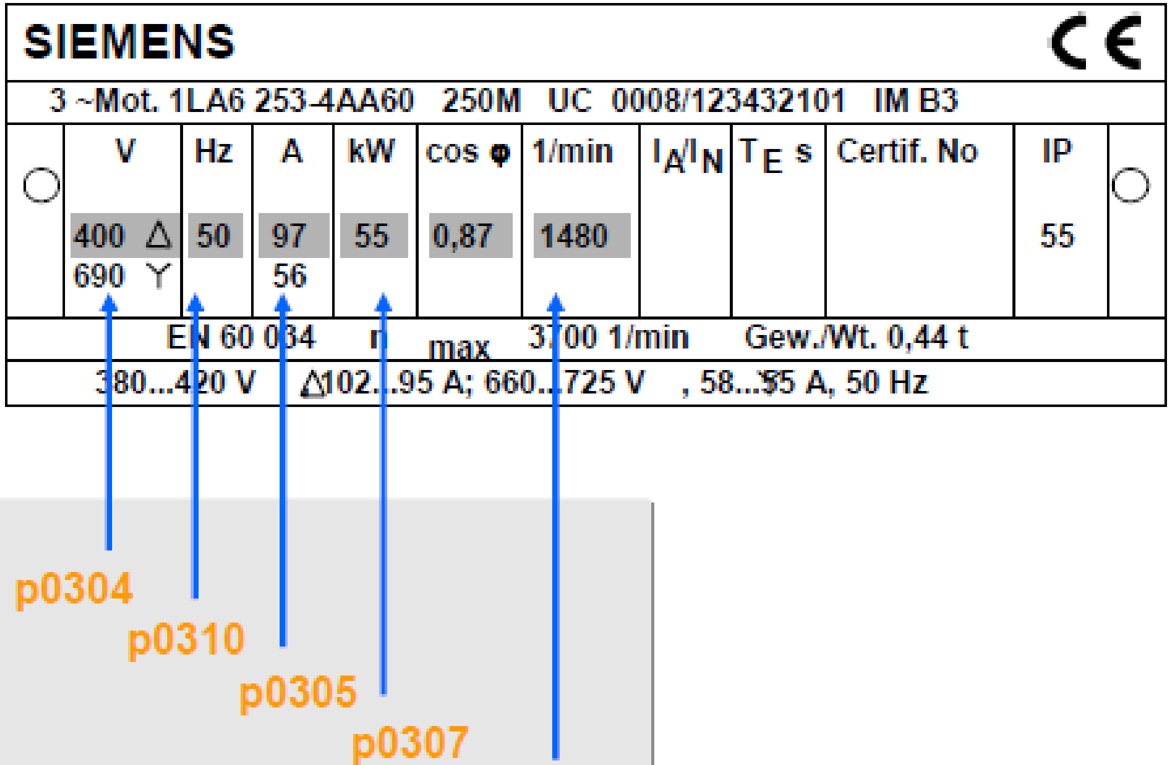
Commissioning

1. Quick commissioning
2. Commissioning the application

Pre-commissioning requirement

Motor data and start-up parameters





SIEMENS CE

3 ~Mot. 1LA6 253-4AA60 250M UC 0008/123432101 IM B3

	V	Hz	A	kW	cos φ	1/min	I_A/I_N	T_E s	Certif. No	IP	
○	400 Δ 690 Y	50	97 56	55	0,87	1480				55	○

EN 60 034 n max 3700 1/min Gew./Wt. 0,44 t

380...420 V Δ 102...95 A; 660...725 V , 58...55 A, 50 Hz

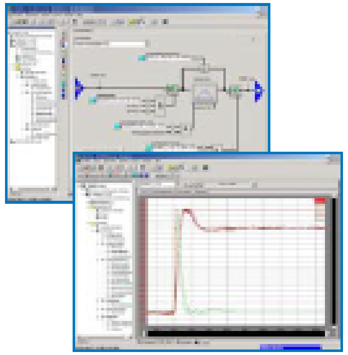
Motor:

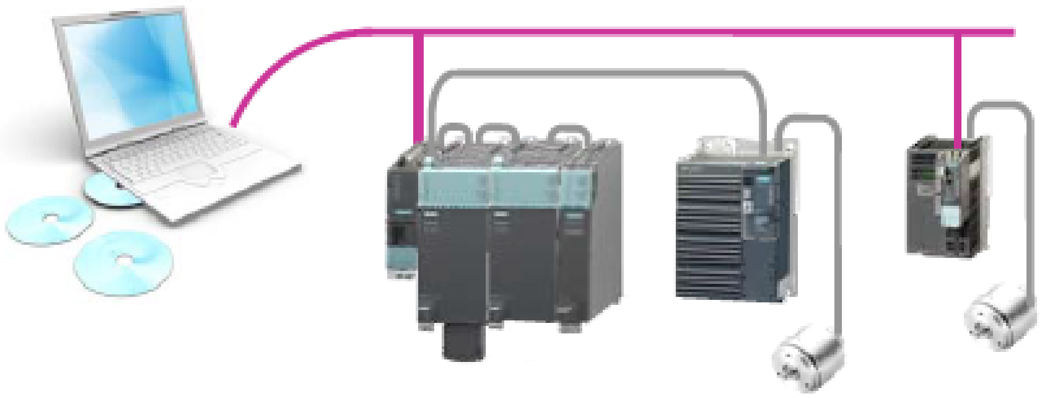
Rated voltage	p0304
Rated frequency	p0310
Rated current	p0305
Rated power	p0307
Rated speed	p0311

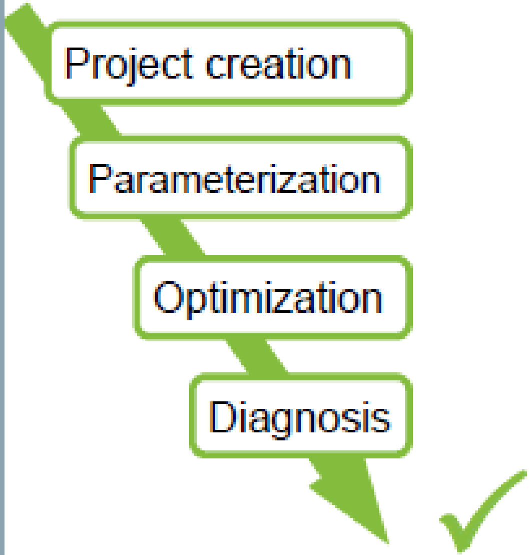
The STARTER tool

SIEMENS

STARTER engineering tool







- **Ensures** overall drive functionality **(incl. technological functions and safety)**
- **The graphic tool allows to select between** guided commissioning **via Wizard and** expert mode
- Central commissioning for all axes
- **(Thinking in modules“ replaces “Thinking in axes“)**
- Central punch-through covering all components, **incl. encoder (via PROFIBUS / PROFINET and DRIVE-CLiQ)**

Consistent tool for all drives and functions

Project creation
Variant 1: Offline

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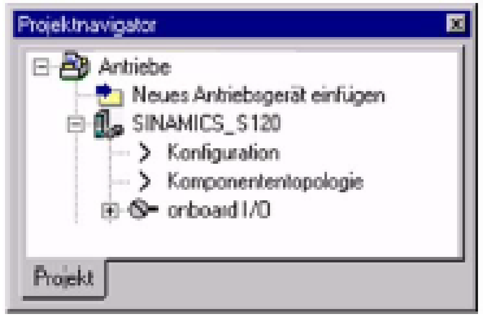
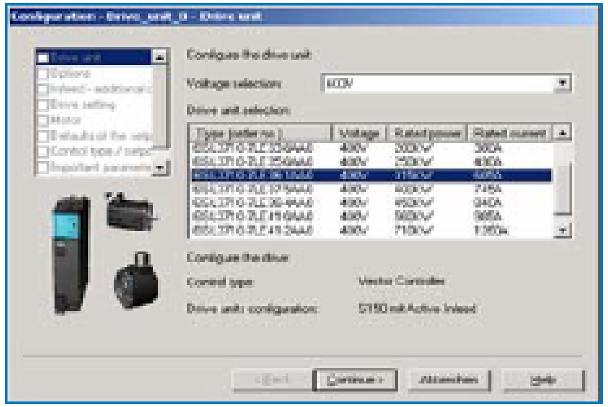
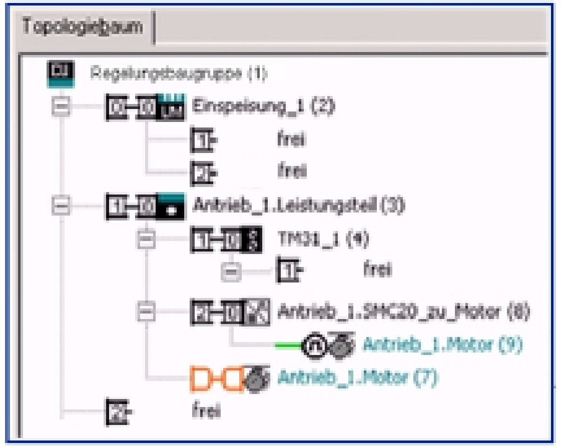






Open project

The **Configuration Wizard** allows to **select** and **configure** all components from the catalog

The topology is automatically defined

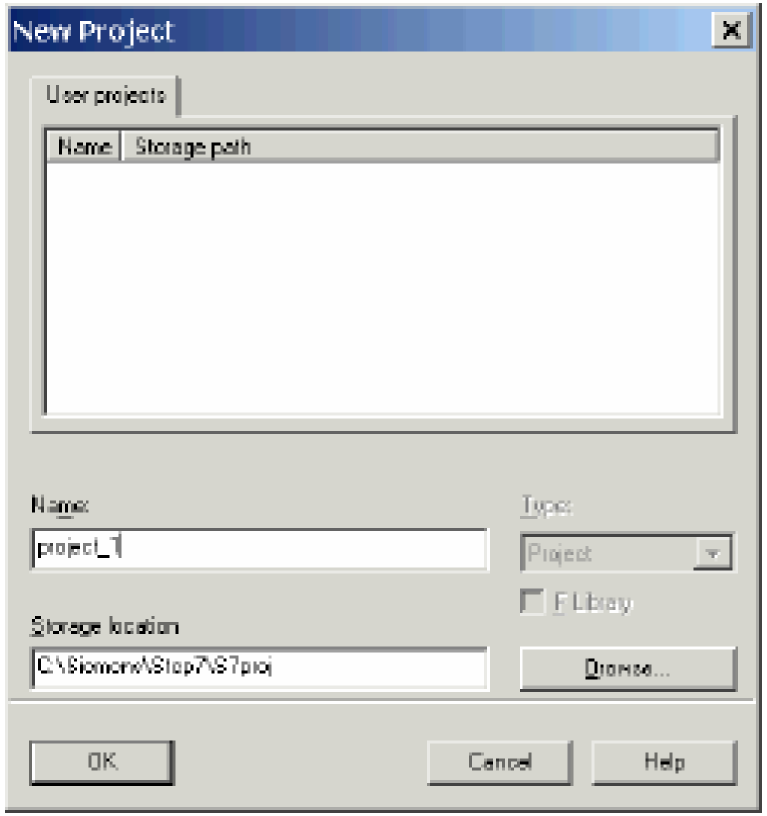
✓ **Project created**

The user is guided interactively through the complete configuration

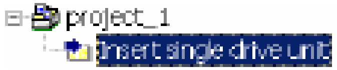
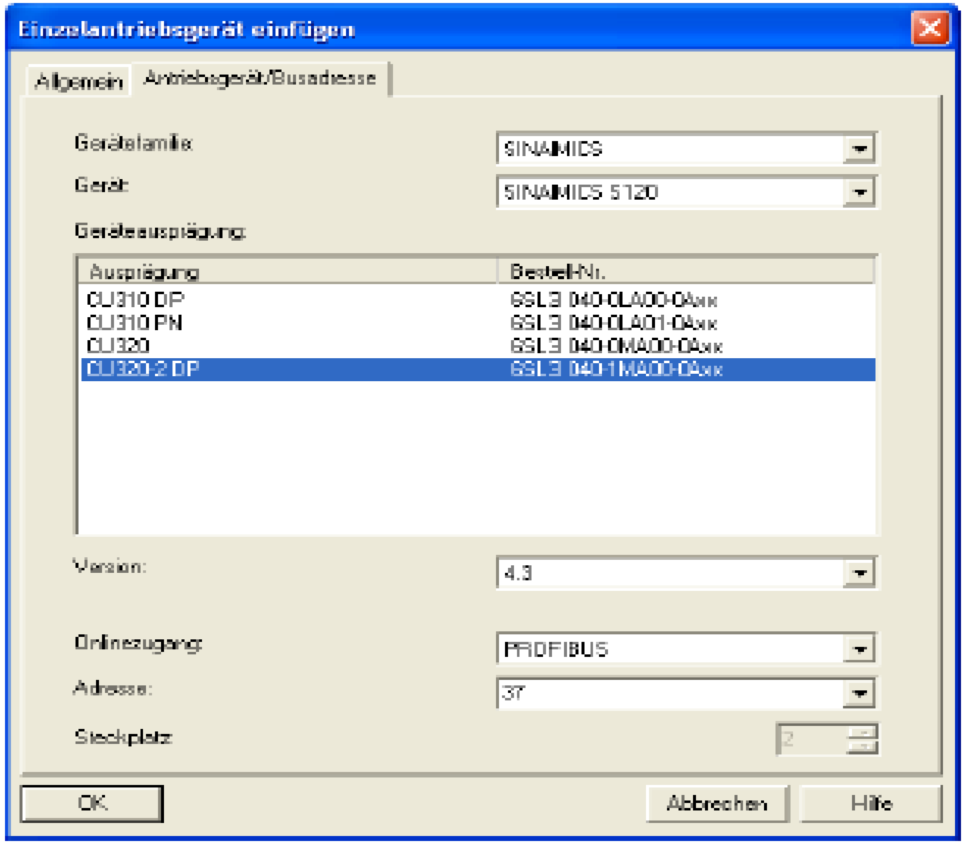
Project creation
Variant 1: Offline

To create a project offline, you need the PROFIBUS address, the device type, e.g. SINAMICS S120, and the device version, e.g. firmware version 4.3.

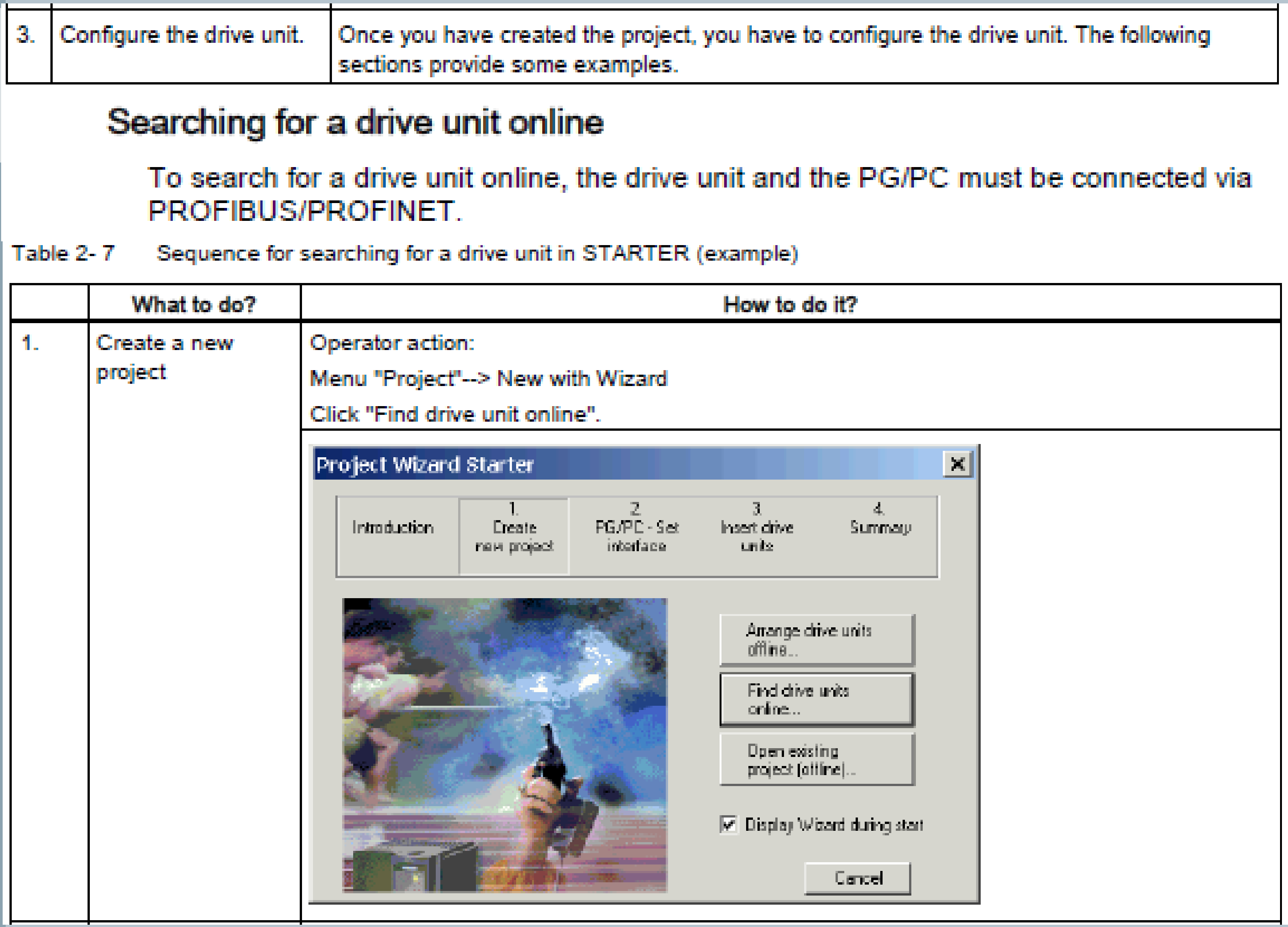
Table 2- 6 Example of a sequence for creating a project in STARTER

	What to do?	How to do it?	Comment
1.	Create a new project	• Operator action: – Menu "Project"--> New ... • User projects: – Projects already in the target directory • Name: Project_1 (can be freely selected) Type: Project Storage location (path): Default (can be set as required)	The project is created offline and loaded to the target system when configuration is complete.
		 New Project User projects Name Storage path Type: F Library Browse... OK Cancel Help Name: project_1 Type: Project Storage location: C:\Siemens\Step7\S7proj	

Project creation
Variant 1: Offline

2.	Add individual drive	Operator action: --> Double-click "Add individual drive unit". Device type: SINAMICS S120 (can be selected) Device version: 4.3 (can be selected) Address type: PROFIBUS/USS/PPI (can be selected) Bus address: 37 (can be selected)	Information about the bus address: The PROFIBUS address of the Control Unit must be set for initial commissioning. Using the rotary coding switches on the Control Unit, the address can be set to a value between 1 and 126 and read via p0918. If the coding switches are at "0" (factory setting), the value can be alternatively set between 1 and 126 using p0918.
	What to do?	**How to do it?**	**Comment**
	 project_1 Insert single drive unit	 Einzelantriebsgerät einfügen Allgemein / Antriebsgerät/Busadresse Gerätefamilie: SINAMICS Gerät: SINAMICS S120 Geräteausprägung: Ausprägung – Bestell-Nr. CU310 DP – 6SL3 040-0LA00-0Axx CU310 PN – 6SL3 040-0LA01-0Axx CU320 – 6SL3 040-0MA00-0Axx CU320-2 DP – 6SL3 040-1MA00-0Axx Version: 4.3 Onlinezugang: PROFIBUS Adresse: 37 Steckplatz: 2	

Project creation
Variant 1: Offline



3.	Configure the drive unit.	Once you have created the project, you have to configure the drive unit. The following sections provide some examples.

Searching for a drive unit online

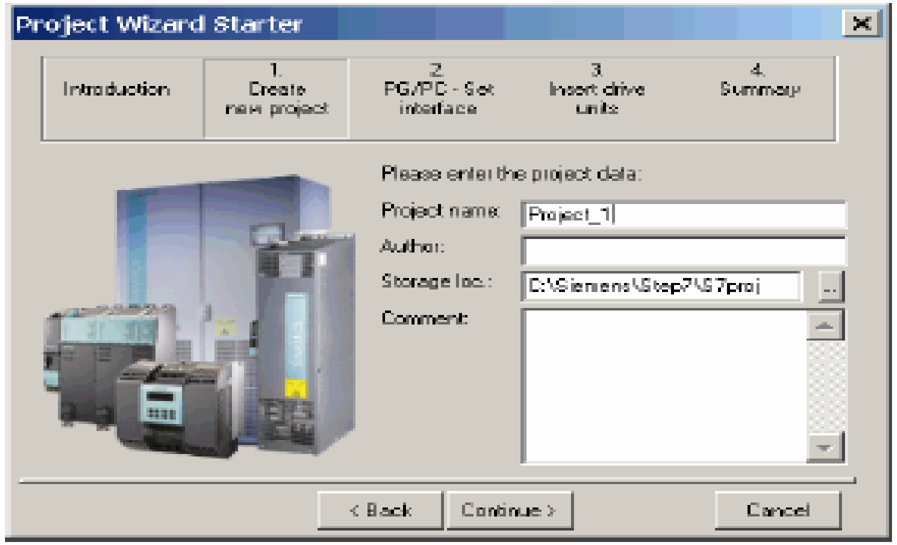
To search for a drive unit online, the drive unit and the PG/PC must be connected via PROFIBUS/PROFINET.

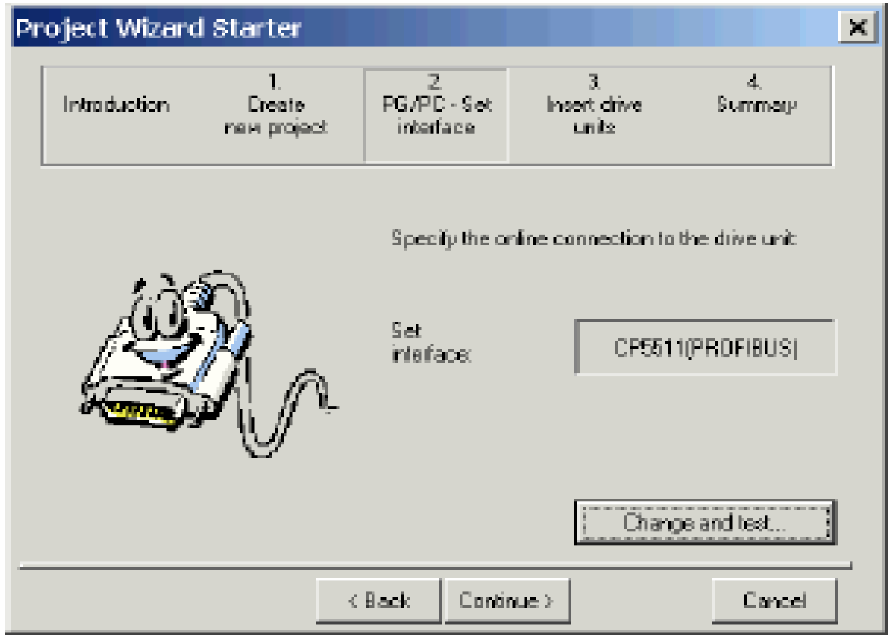
Table 2- 7 Sequence for searching for a drive unit in STARTER (example)

	What to do?	How to do it?
1.	Create a new project	Operator action: Menu "Project"--> New with Wizard Click "Find drive unit online".

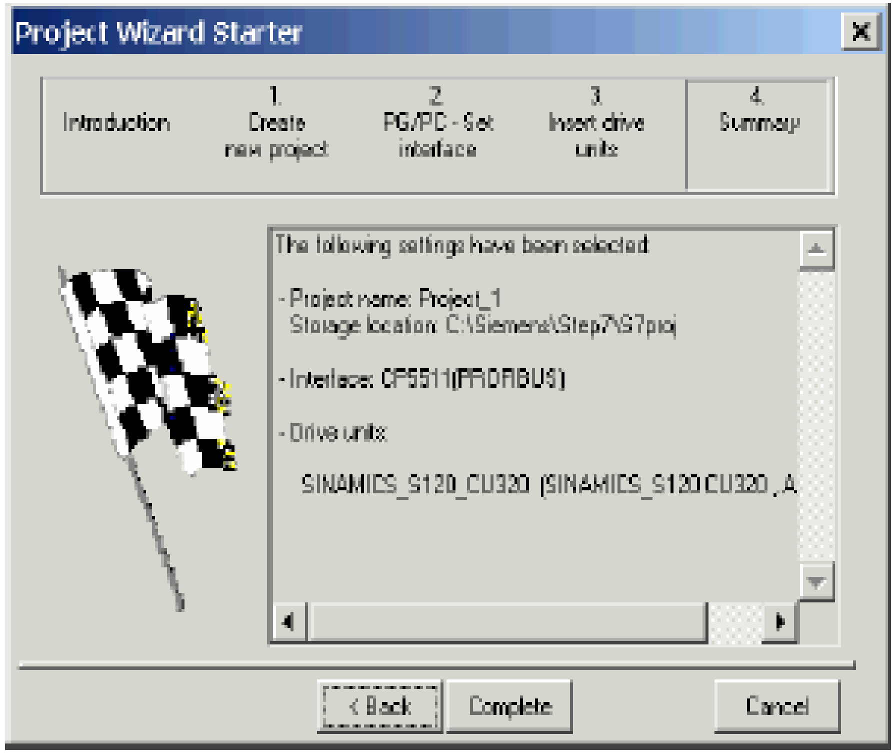
Project Wizard Starter
Introduction
1. Create new project
2. PG/PC - Set interface
3. Insert drive units
4. Summary
Arrange drive units offline...
Find drive units online...
Open existing project (offline)...
☑ Display Wizard during start
Cancel

Project creation
Variant 1: Offline

1.1	Enter the project data.	Project name: Project_1 (can be freely selected) Author: Any Comment: Any
		 Project Wizard Starter Please enter the project data: Project name: Project_1 Author: Storage loc.: C:\Siemens\Step7\S7proj Comment: Introduction 1. Create new project 2. PG/PC - Set interface 3. Insert drive units 4. Summary < Back Continue > Cancel
2.	Set up the PG/PC	Here, you can set up the PG/PC interface by clicking "Change and test".

	What to do?	How to do it?
	interface	 Project Wizard Starter Specify the online connection to the drive unit: Set interface: CP5511(PROFIBUS) Introduction 1. Create new project 2. PG/PC - Set interface 3. Insert drive units 4. Summary Change and test... < Back Continue > Cancel

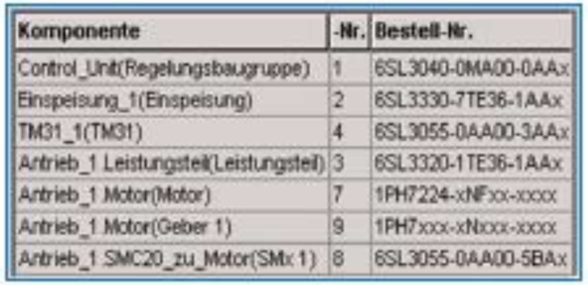
Project creation
Variant 1: Offline

	What to do?	How to do it?
4.	Summary	You have now created the project. -> Click "Complete".  Project Wizard Starter Introduction 1. Create new project 2. PG/PC - Set interface 3. Insert drive units 4. Summary < Back Complete Cancel The following settings have been selected: - Project name: Project_1 Storage location: C:\Siemens\Step7\S7proj - Interface: CP5511(PROFIBUS) - Drive units: SINAMICS_S120_CU320 (SINAMICS_S120 CU320 , A
5.	Configure the drive unit.	Once you have created the project, you have to configure the drive unit. The following sections provide some examples.

Project creation
Variant 2: Online

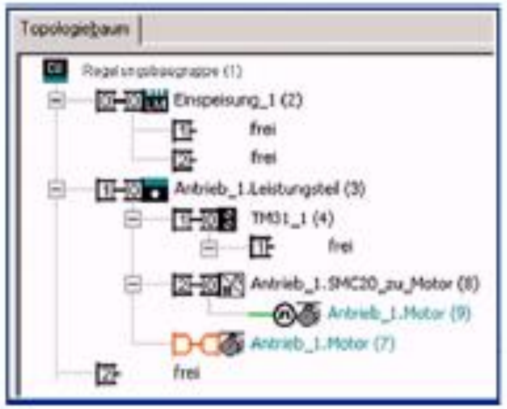
Set up connection

Read in all components and component data (electronic nameplates)



Komponente	-Nr.	Bestell-Nr.
Control_Unit(Regelungsbaugruppe)	1	6SL3040-0MA00-0AAx
Einspeisung_1(Einspeisung)	2	6SL3330-7TE36-1AAx
TM31_1(TM31)	4	6SL3055-0AA00-3AAx
Antrieb_1.Leistungsteil(Leistungsteil)	3	6SL3320-1TE36-1AAx
Antrieb_1.Motor(Motor)	7	1PH7224-xNFxx-xxxx
Antrieb_1.Motor(Geber 1)	9	1PH7xxx-xNxxx-xxxx
Antrieb_1.SMC20_zu_Motor(SMx 1)	8	6SL3055-0AA00-5BAx

The topology is read in as well

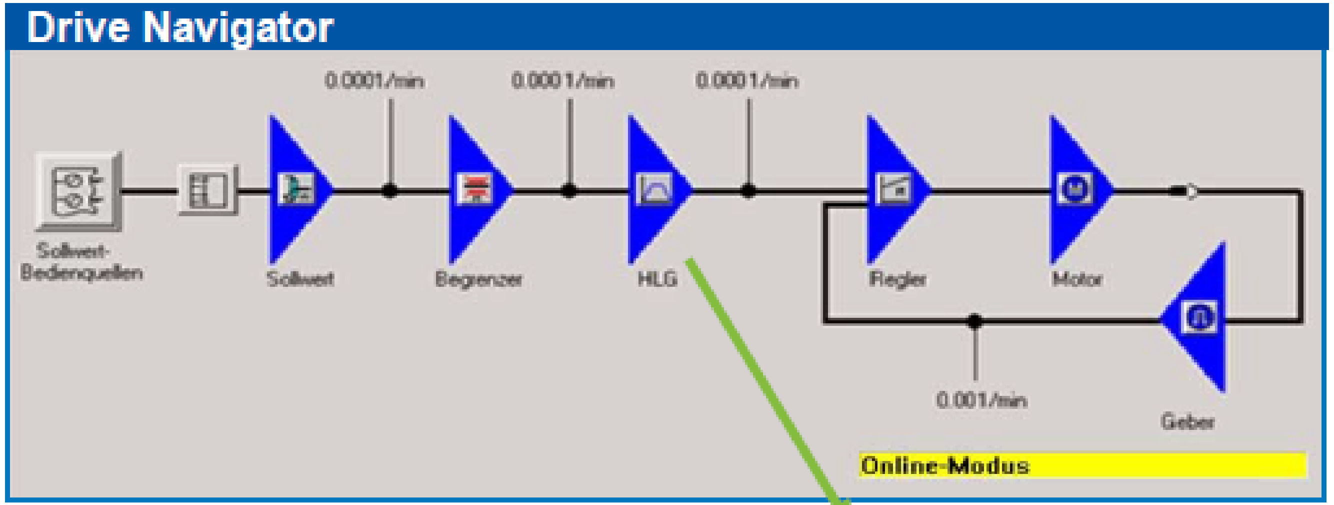


✓ Project created, motor rotating

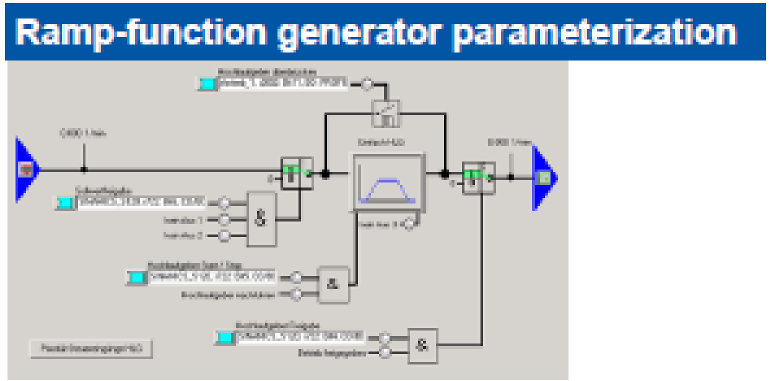
With a few keystrokes to the rotating motor

Parameterization of the functionality

The complete parameterization is carried out via the ‘Drive Navigator’



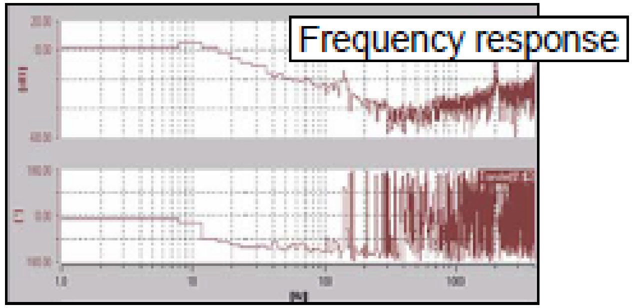
- Clear representation of the controlled system / process
- Graphic input screens for parameterizing individual blocks
- The Drive Navigator is available
  - offline for parameterization
  - online for monitoring and adaptation

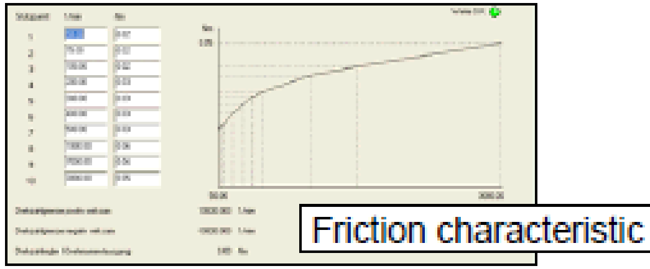


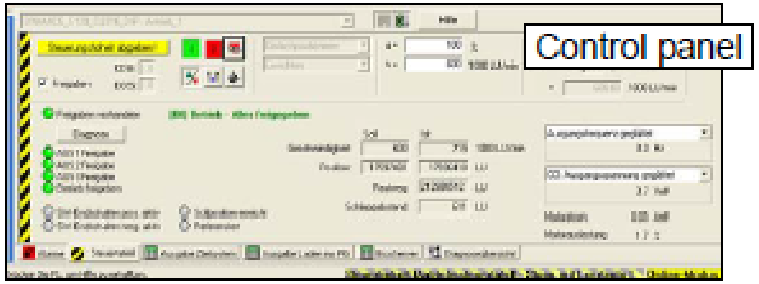
Convenient and clear parameterization of the overall functionality

Drive optimization

- **The STARTER provides numerous different tools for drive optimization:**
- Automatic speed controller optimization
- Frequency response measurement with FFT and Bode chart (for manual controller optimization)
- Measuring functions for motor identification (e.g. with third-party motors)
- Determination of friction characteristics
- …


Frequency response


Friction characteristic


Control panel

Complete drive control and monitoring via the STARTER control panel.

From basic through to sophisticated - tools for any optimization level

Direct and transparent drive control from the PC

Diagnosis

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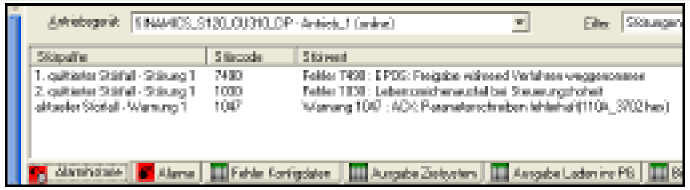
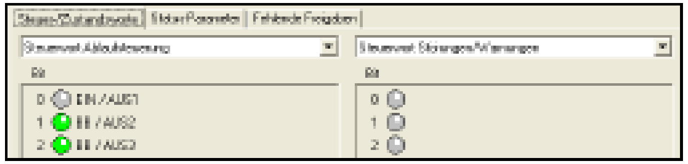
Alarm history

- List of errors / faults / warnings occurred
- Specification of the time of occurrence and acknowledgement



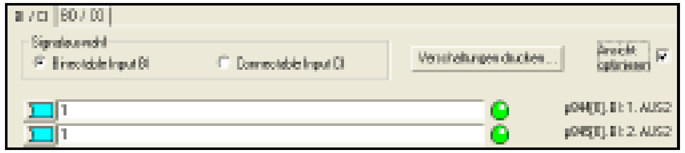
Display of signal statuses

- Control and status words
- Warnings, faults, releases missing



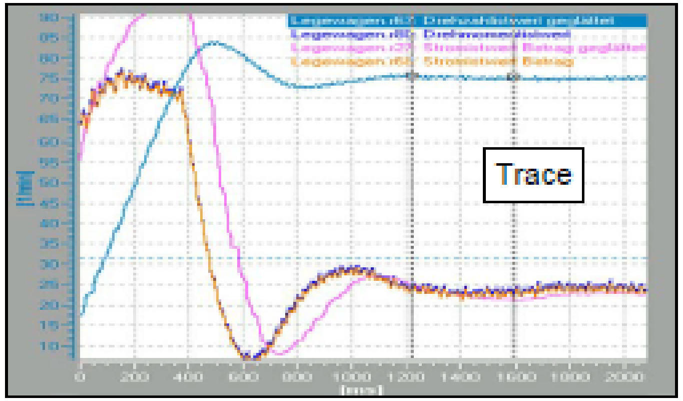
Wiring overview

- Quick overview about drive signal wiring



Powerful trace:

- Drive oscilloscope function for drive signal recording
- Two independent recorders for up to 8 signals
- Various trigger settings, endless trace
- Automatic or manual axis scaling
- Signal measurement via cursor



Efficient troubleshooting using high performance tools

Important functions via BOP

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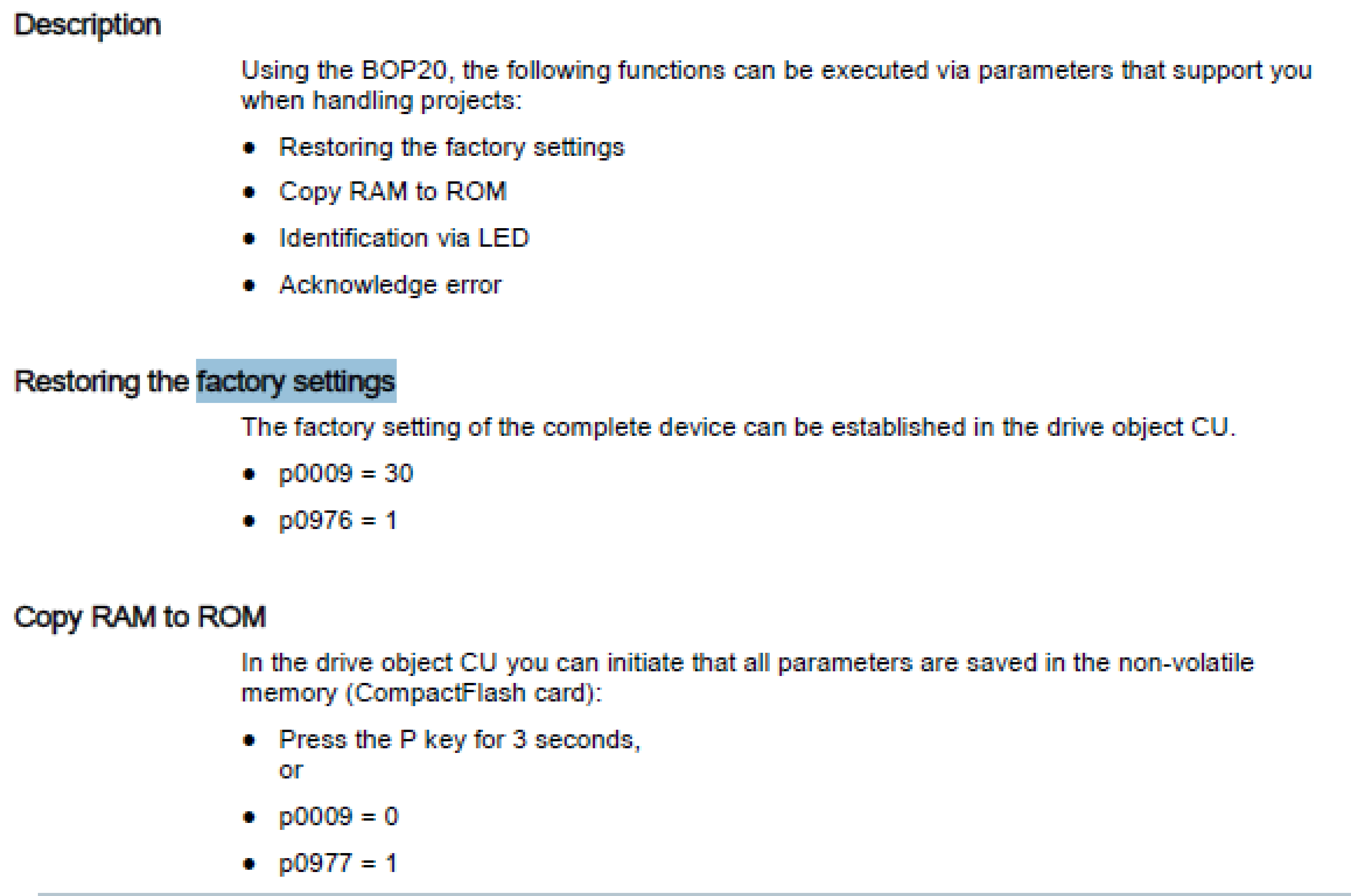
Acknowledge error

To acknowledge all the faults that have been rectified, press the **Fn** key.



Description

Using the BOP20, the following functions can be executed via parameters that support you when handling projects:

- Restoring the factory settings
- Copy RAM to ROM
- Identification via LED
- Acknowledge error

Restoring the factory settings

The factory setting of the complete device can be established in the drive object CU.

- p0009 = 30
- p0976 = 1

Copy RAM to ROM

In the drive object CU you can initiate that all parameters are saved in the non-volatile memory (CompactFlash card):

- Press the P key for 3 seconds,
  or
- p0009 = 0
- p0977 = 1

Quick commissioning using the BOP

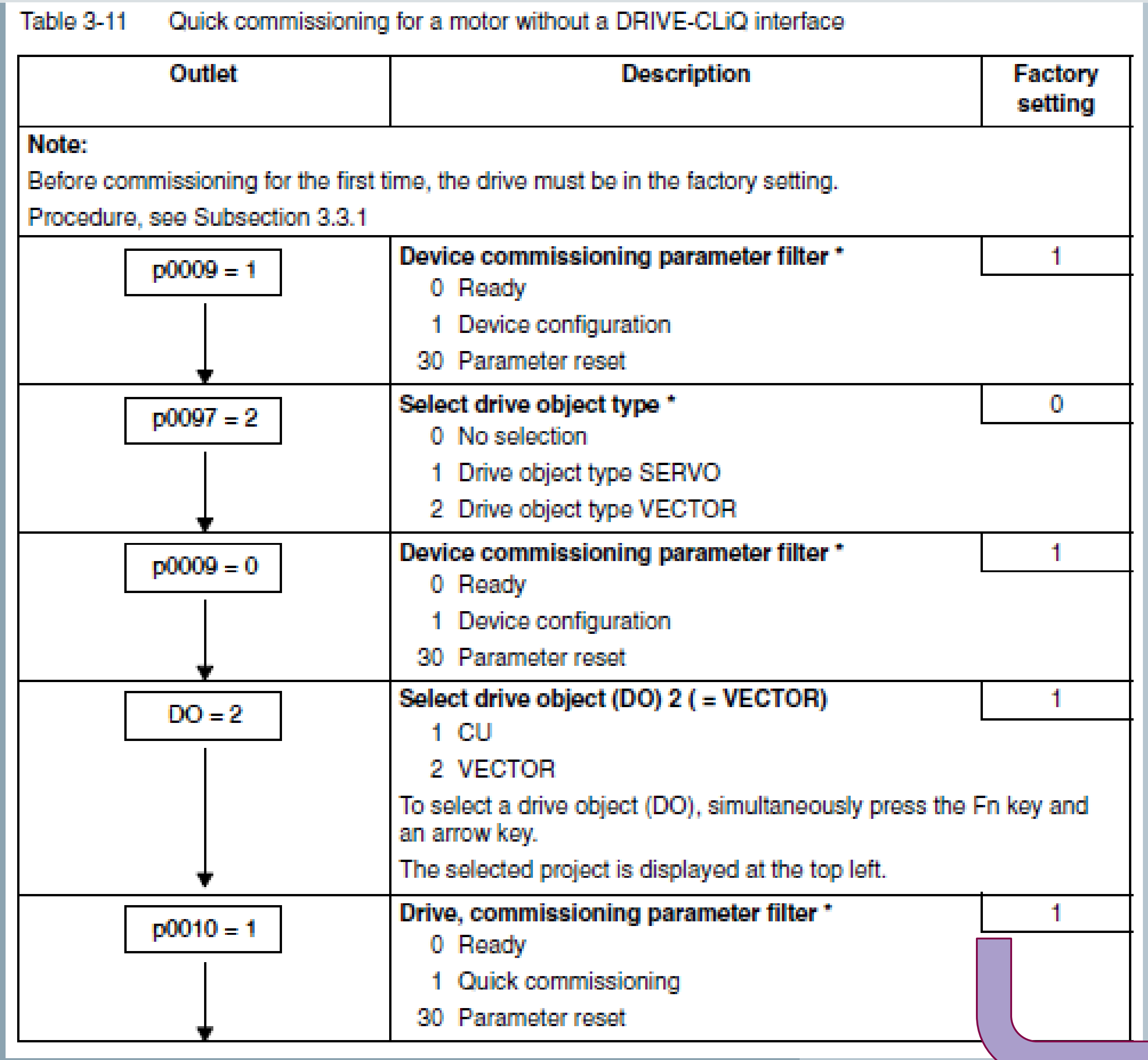
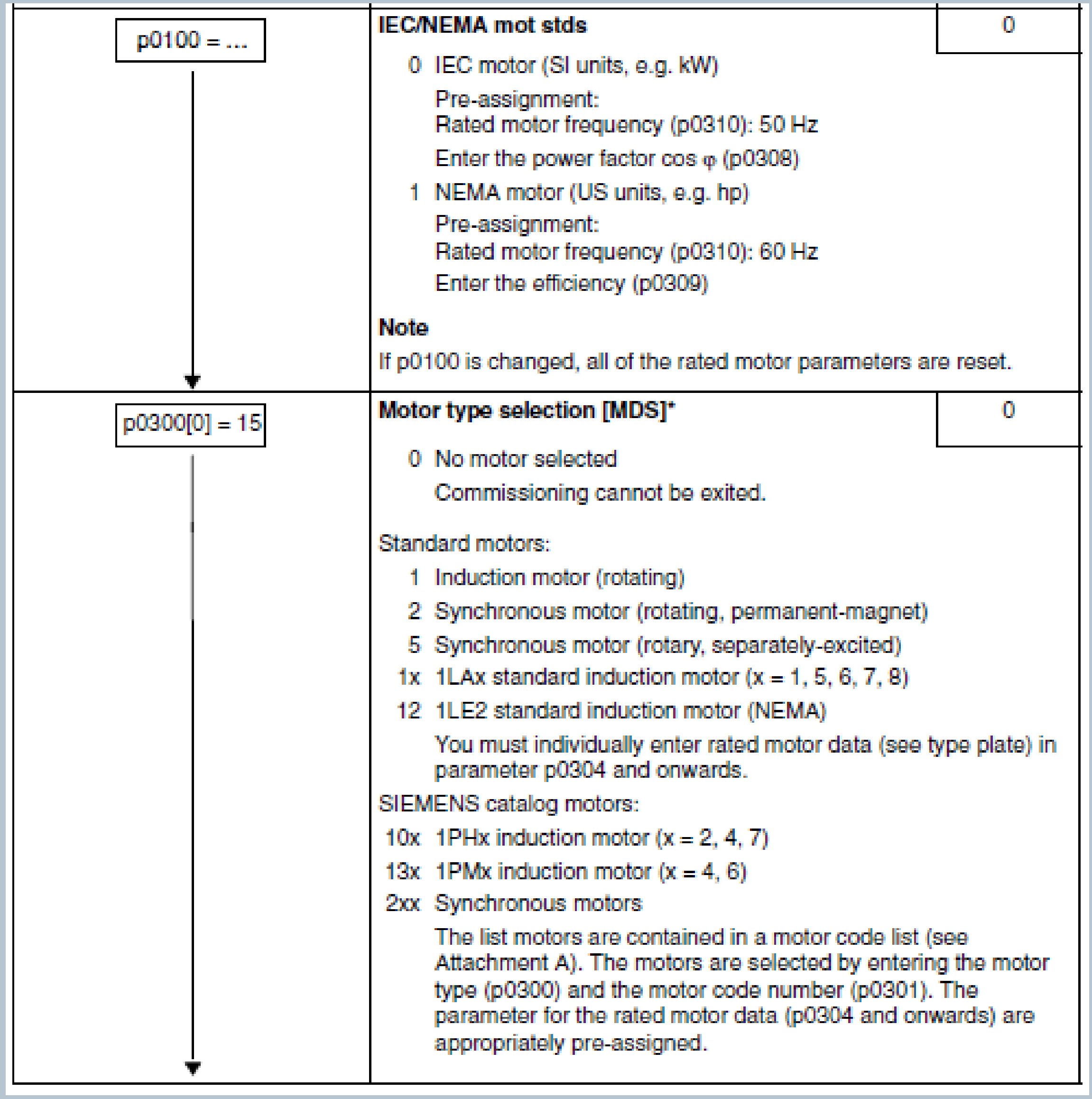


Table 3-11 Quick commissioning for a motor without a DRIVE-CLiQ interface

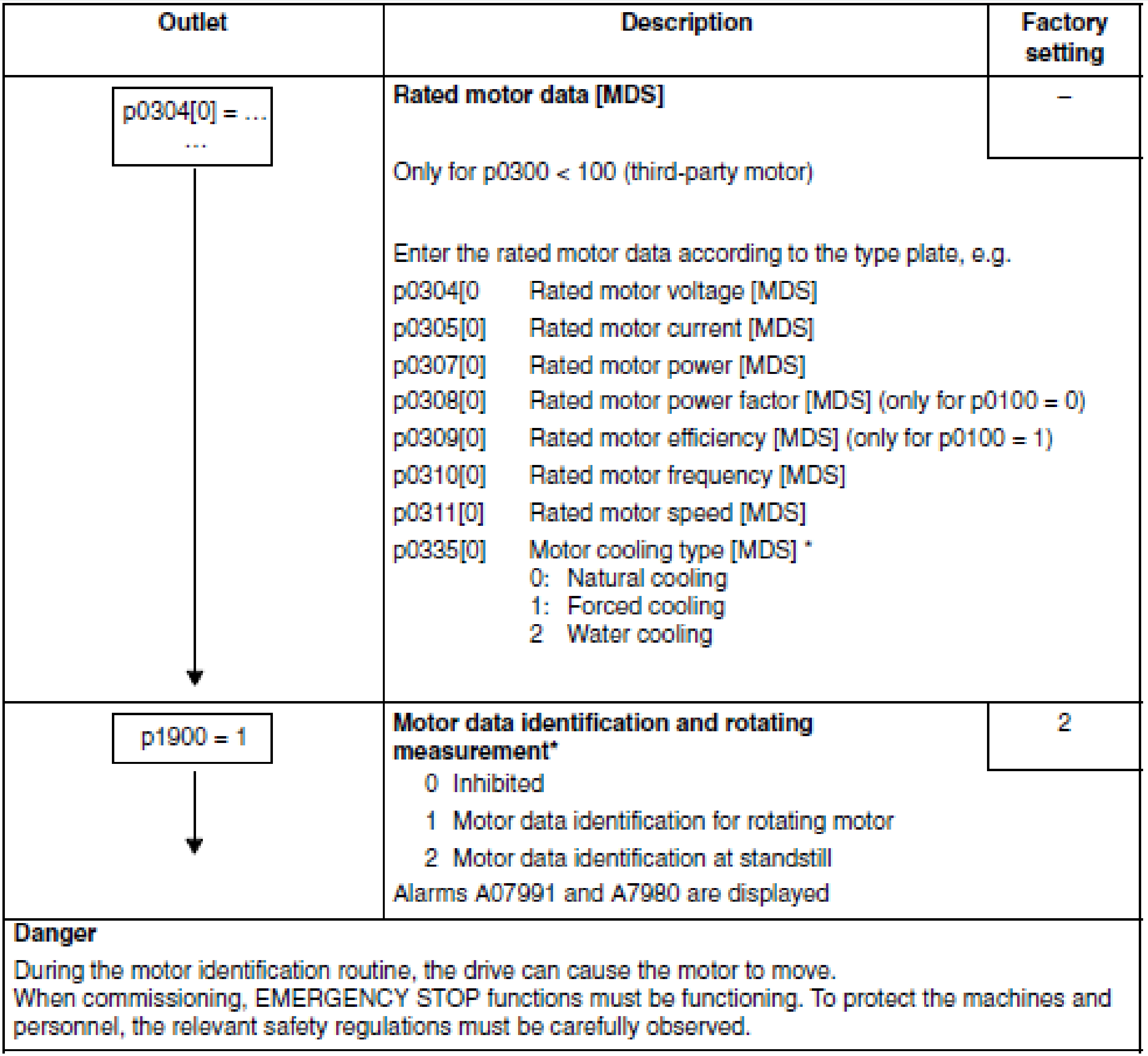
Outlet	Description	Factory setting
Note: Before commissioning for the first time, the drive must be in the factory setting. Procedure, see Subsection 3.3.1		
p0009 = 1	**Device commissioning parameter filter** * 0 Ready 1 Device configuration 30 Parameter reset	1
p0097 = 2	**Select drive object type** * 0 No selection 1 Drive object type SERVO 2 Drive object type VECTOR	0
p0009 = 0	**Device commissioning parameter filter** * 0 Ready 1 Device configuration 30 Parameter reset	1
DO = 2	**Select drive object (DO) 2 (= VECTOR)** 1 CU 2 VECTOR To select a drive object (DO), simultaneously press the Fn key and an arrow key. The selected project is displayed at the top left.	1
p0010 = 1	**Drive, commissioning parameter filter** * 0 Ready 1 Quick commissioning 30 Parameter reset	1



p0100 = ...	**IEC/NEMA mot stds** 0 IEC motor (SI units, e.g. kW) Pre-assignment: Rated motor frequency (p0310): 50 Hz Enter the power factor cos φ (p0308) 1 NEMA motor (US units, e.g. hp) Pre-assignment: Rated motor frequency (p0310): 60 Hz Enter the efficiency (p0309) **Note** If p0100 is changed, all of the rated motor parameters are reset.	0
p0300[0] = 15	**Motor type selection [MDS]*** 0 No motor selected Commissioning cannot be exited. Standard motors: 1 Induction motor (rotating) 2 Synchronous motor (rotating, permanent-magnet) 5 Synchronous motor (rotary, separately-excited) 1x 1LAx standard induction motor (x = 1, 5, 6, 7, 8) 12 1LE2 standard induction motor (NEMA) You must individually enter rated motor data (see type plate) in parameter p0304 and onwards. SIEMENS catalog motors: 10x 1PHx induction motor (x = 2, 4, 7) 13x 1PMx induction motor (x = 4, 6) 2xx Synchronous motors The list motors are contained in a motor code list (see Attachment A). The motors are selected by entering the motor type (p0300) and the motor code number (p0301). The parameter for the rated motor data (p0304 and onwards) are appropriately pre-assigned.	0

Quick commissioning using the BOP

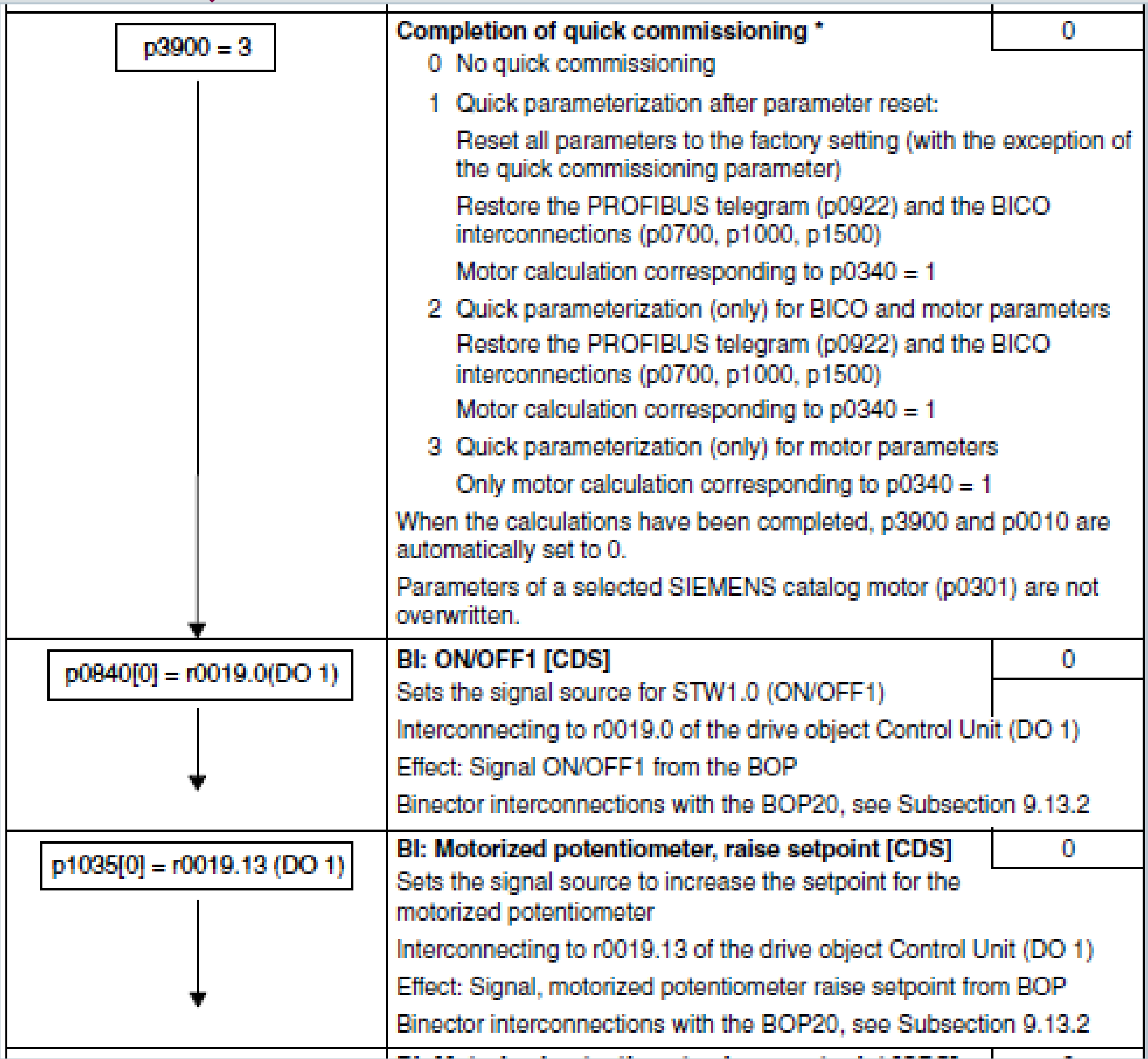
SIEMENS



Outlet	Description	Factory setting
p0304[0] = … …	**Rated motor data [MDS]** Only for p0300 < 100 (third-party motor) Enter the rated motor data according to the type plate, e.g. p0304[0 Rated motor voltage [MDS] p0305[0] Rated motor current [MDS] p0307[0] Rated motor power [MDS] p0308[0] Rated motor power factor [MDS] (only for p0100 = 0) p0309[0] Rated motor efficiency [MDS] (only for p0100 = 1) p0310[0] Rated motor frequency [MDS] p0311[0] Rated motor speed [MDS] p0335[0] Motor cooling type [MDS] * 0: Natural cooling 1: Forced cooling 2 Water cooling	–
p1900 = 1	**Motor data identification and rotating measurement*** 0 Inhibited 1 Motor data identification for rotating motor 2 Motor data identification at standstill Alarms A07991 and A7980 are displayed	2

Danger

During the motor identification routine, the drive can cause the motor to move.
When commissioning, EMERGENCY STOP functions must be functioning. To protect the machines and personnel, the relevant safety regulations must be carefully observed.



p3900 = 3	**Completion of quick commissioning *** 0 No quick commissioning 1 Quick parameterization after parameter reset: Reset all parameters to the factory setting (with the exception of the quick commissioning parameter) Restore the PROFIBUS telegram (p0922) and the BICO interconnections (p0700, p1000, p1500) Motor calculation corresponding to p0340 = 1 2 Quick parameterization (only) for BICO and motor parameters Restore the PROFIBUS telegram (p0922) and the BICO interconnections (p0700, p1000, p1500) Motor calculation corresponding to p0340 = 1 3 Quick parameterization (only) for motor parameters Only motor calculation corresponding to p0340 = 1 When the calculations have been completed, p3900 and p0010 are automatically set to 0. Parameters of a selected SIEMENS catalog motor (p0301) are not overwritten.	0
p0840[0] = r0019.0(DO 1)	**BI: ON/OFF1 [CDS]** Sets the signal source for STW1.0 (ON/OFF1) Interconnecting to r0019.0 of the drive object Control Unit (DO 1) Effect: Signal ON/OFF1 from the BOP Binector interconnections with the BOP20, see Subsection 9.13.2	0
p1035[0] = r0019.13 (DO 1)	**BI: Motorized potentiometer, raise setpoint [CDS]** Sets the signal source to increase the setpoint for the motorized potentiometer Interconnecting to r0019.13 of the drive object Control Unit (DO 1) Effect: Signal, motorized potentiometer raise setpoint from BOP Binector interconnections with the BOP20, see Subsection 9.13.2	0

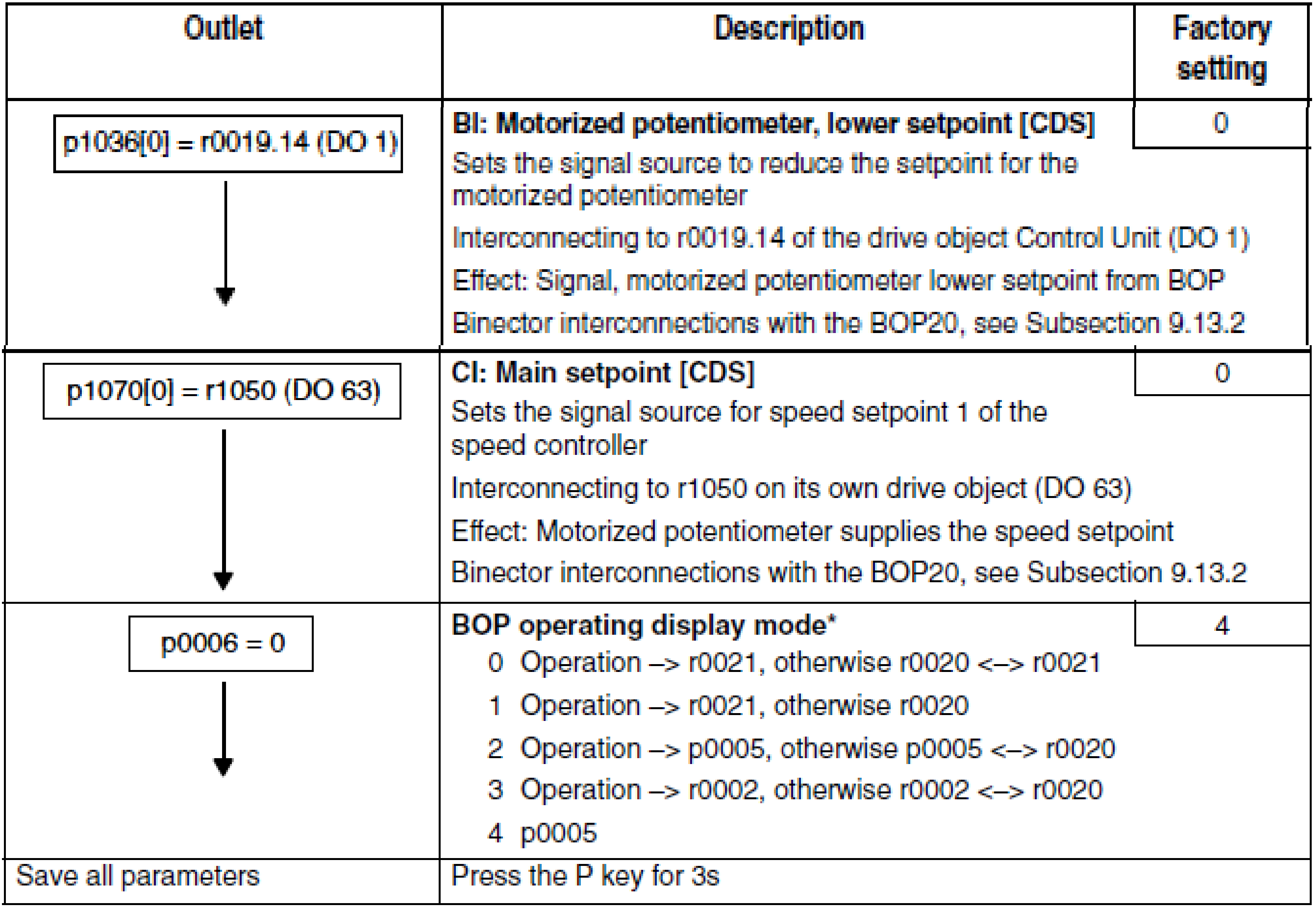
Quick commissioning using the BOP

SIEMENS

These parameters offer more setting possibilities than specified here. For additional setting possibilities, see the List Manual

- [CDS] Parameter depends on the Command Data Sets (CDS). Data set 0 is preset.
- [DDS] Parameter depends on the Drive Data Sets (DDS). Data set 0 is preset.
- [MDS] Parameter depends on the Motor Data Sets (MDS). Data set 0 is preset.

BI	Binector Input
BO	Binector Output
CI	Connector Input
CO	Connector Output



Outlet	Description	Factory setting
p1036[0] = r0019.14 (DO 1)	**BI: Motorized potentiometer, lower setpoint [CDS]** Sets the signal source to reduce the setpoint for the motorized potentiometer Interconnecting to r0019.14 of the drive object Control Unit (DO 1) Effect: Signal, motorized potentiometer lower setpoint from BOP Binector interconnections with the BOP20, see Subsection 9.13.2	0
p1070[0] = r1050 (DO 63)	**CI: Main setpoint [CDS]** Sets the signal source for speed setpoint 1 of the speed controller Interconnecting to r1050 on its own drive object (DO 63) Effect: Motorized potentiometer supplies the speed setpoint Binector interconnections with the BOP20, see Subsection 9.13.2	0
p0006 = 0	**BOP operating display mode*** 0 Operation –> r0021, otherwise r0020 <–> r0021 1 Operation –> r0021, otherwise r0020 2 Operation –> p0005, otherwise p0005 <–> r0020 3 Operation –> r0002, otherwise r0002 <–> r0020 4 p0005	4
Save all parameters	Press the P key for 3s	

Wiring example for Power Modules Blocksize

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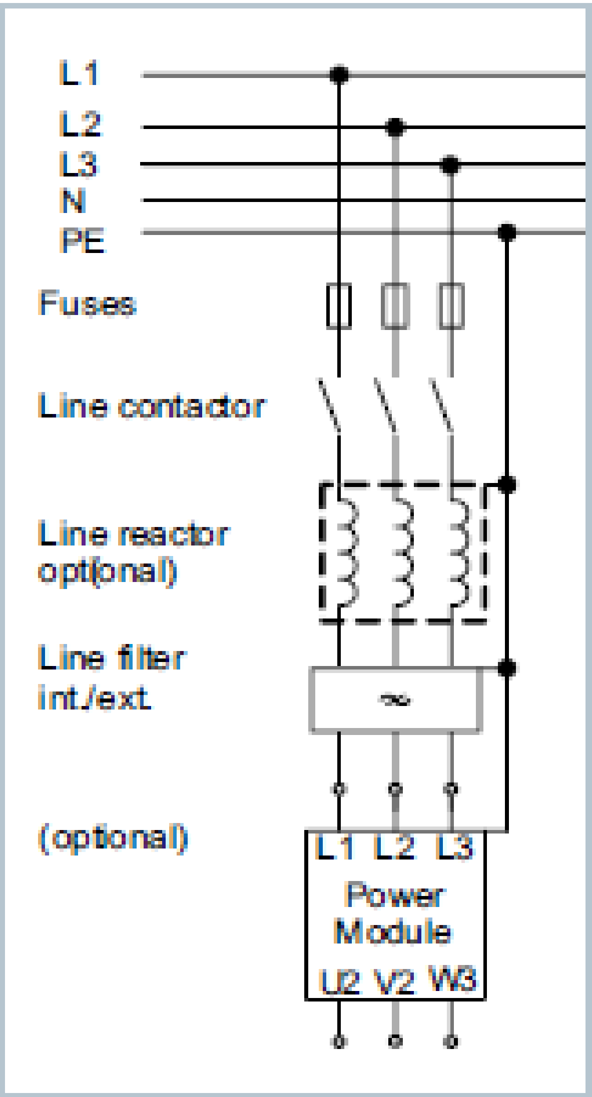
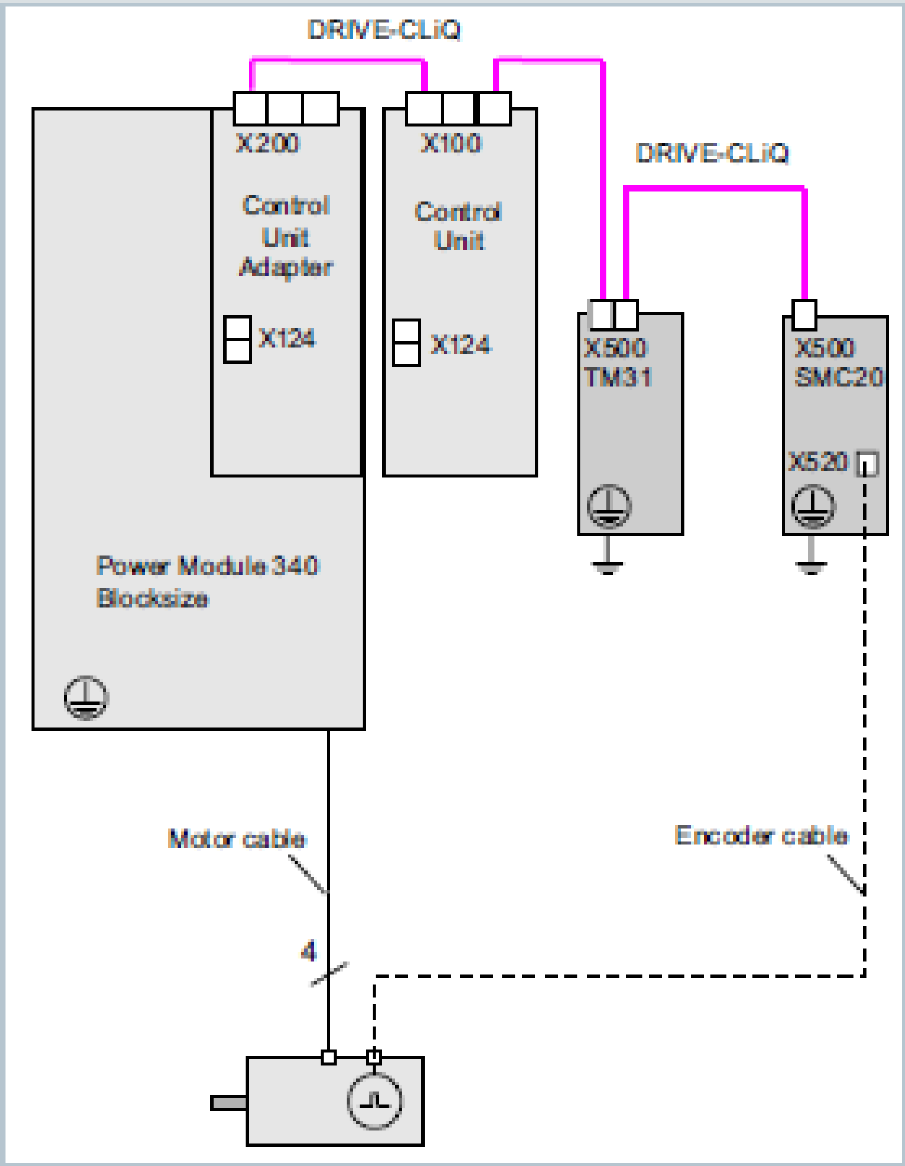
Main components of simulator

COMPONENT	MLFB NO.
PM340	6SL3210-1SE26-0UA0
CU320-2DP	6SL3040-1MA00-0AA0
TM31	6SL3055-0AA00-3AA1
CUA31	6SL3040-0PA00-0AA1

components on the supply network





Task to commission simulation kit and using the STARTER

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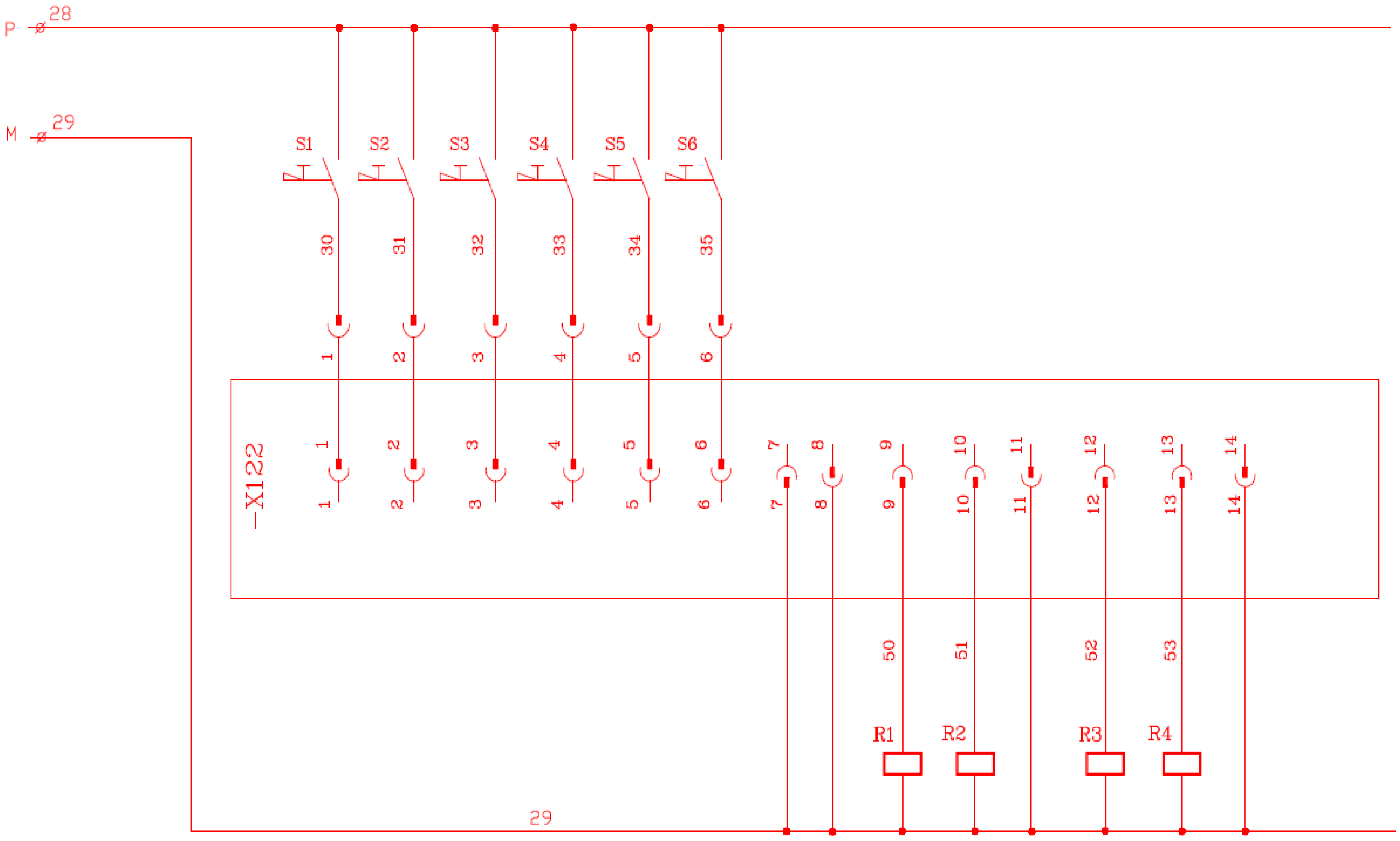
1. A 3 phase induction motor is to run using S120 drive. Use S1 switch to Start/Stop the drive, S2 switch to change the motor direction, S3 switch to reset the drive, Switch S4(MOP-Up) and Switch S5(MOP-Down) for speed increase and decrease.

Motor Data is as follows:

Motor power- 5.5 KW
Motor Current- 10 A
Motor Speed- 2850 rpm
Motor voltage- 415 V
Motor Freq- 50 Hz



Advantages

Fast and cost-efficient implementation of different machine versions

- Through convenient adaptation to single/multi-axis concepts, machine or performance versions, energy and cooling concepts, motor and encoder types

Reduced construction volume

- Due to fine graduated range of designs and sizes
- Using double-axis modules and Booksize Compact devices
- Due to omission of braking choppers and braking resistors

High availability

- Separation of power units and control electronics
- Using cooling variants enabling solutions for the most diverse mechanical and thermal operating conditions
- Due to prompt part replacement (no reconfiguration due to Memory Card)

Short commissioning times

- Through reduction to ONE drive system for all applications, motors and encoders
- Through standardized and convenient connection of all components (DRIVE-CLiQ, with preassembled cables, Click connection and Plug & Play functionality)

Superior energy efficiency

- Through infeed/regenerative feedback modules with superior efficiency (cosφ=1)

Conclusion

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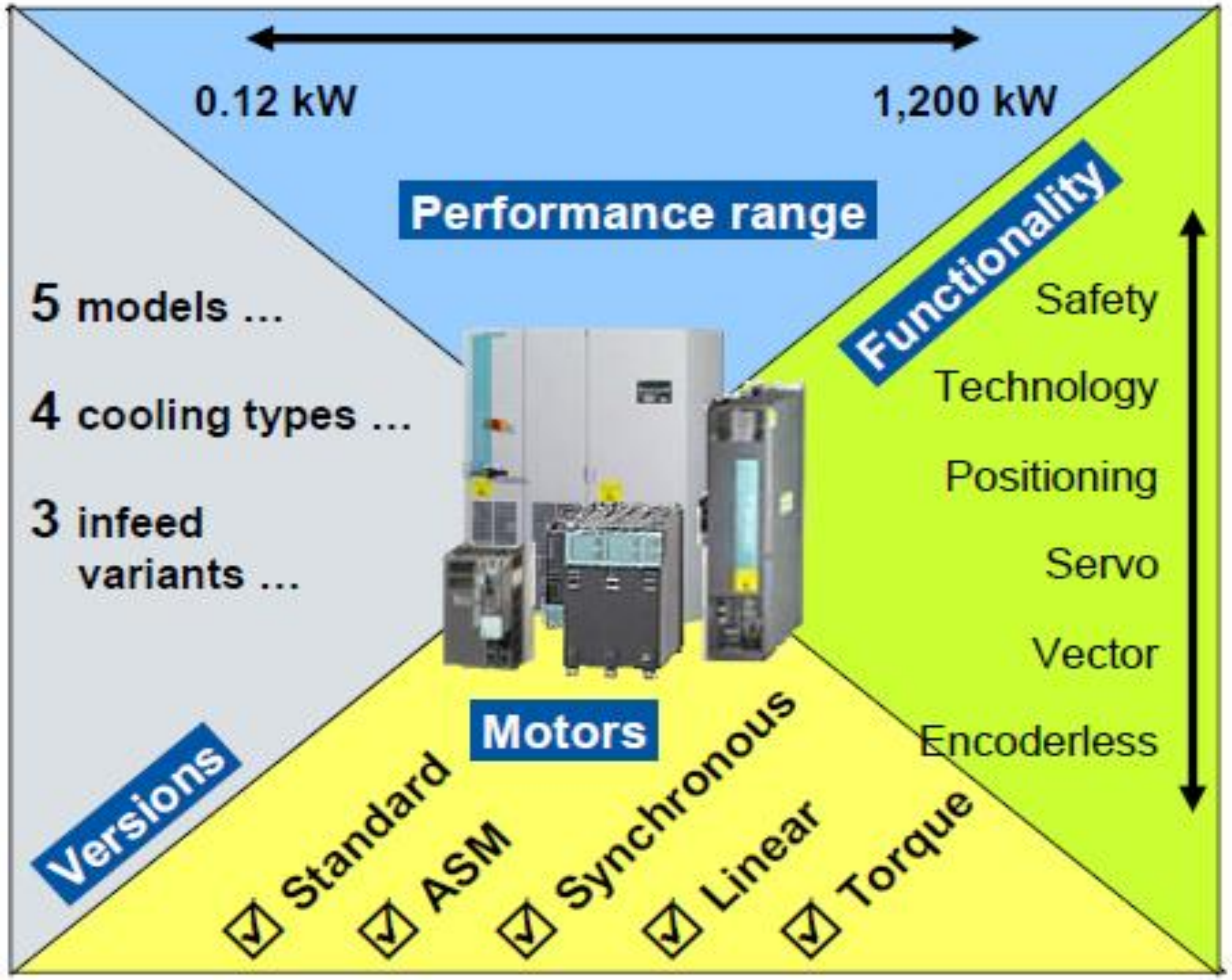

Sinamics S120-All Rounder

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Thank you

Source of Information

Information in this manual has been collected from various internet sites, SIEMENS Catalogue and Manuals.

Prepared by:-

Moghees Ahsan, Dy. Manager (ETL)